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1. GENERAL ASPECTS

1.2. Components

3381. A new collagen sponge to dress open wounds - Collins J., Peacock E.E. Jr. and Chvapil M. - Dept. Surg., Univ. Arizona Coll. Med., Tucson, Ariz. USA - SURG.FORUM. 1976 Vol. 27 (551-553)

Previous attempts to dress open wounds with a biological dressing such as reconstituted collagen have been discouraging because porosity of the sponge could not be maintained and connective tissue ingrowth did not occur. A new sponge made of acid swollen collagen, in which porosity is maintained by glutaraldehyde cross linking followed by freezing at a critical time and temperature, has been evaluated as a biological dressing for open wounds. The data presented in this paper suggest that, under the conditions of the experiments, collagen sponge significantly affected rate of epithelization over a two week period and increased wound contraction during the first seven days of healing as compared to wounds which were dressed with porcine skin and Xeroform gauze. Net rate of collagen synthesis and deposition also was accelerated in wounds treated with collagen sponge.

3382. An improved voltage variable resistor m.o.s.t. - Townsend W.G. and Demetriou A. - Dept. Electr. Electron. Engin., Univ. Coll., Swansea ENG - RADIO ELECTRON.ENGINEER 1976 46/7 (350-354)

A method of designing enhancement mode m.o.s.t.s having controllable turn on characteristics is described. The m.o.s.t.s are specifically aimed at performing the functions of voltage controlled resistors and the design called for a log linear variation in channel resistance with gate voltage over as wide a range as possible. The devices were made using a conventional p channel oxide gate process with an additional n^+ diffusion stage to give the required variation of threshold voltage at different points within the device. In the final form of the m.o.s.t. the log linear range of channel resistance variation extended from 5MΩ to 500Ω for an applied gate voltage range 4-15 V. The design method used for these devices could equally well be applied to making composite m.o.s.t.s having another form of channel resistance variation from the log linear variation studied here.

2. BIOPHYSICS AND BIOENGINEERING

3383. When is screening effective in reducing the death rate? - Blumenson L.E. - Dept. Biostatist., Roswell Park Mem. Inst., Buffalo, N.Y. 14263 USA - MATH.BIOSCI. 1976 30/3-4 (273-303)

Periodic screening programs for the early detection of chronic diseases such as cancer and heart disease may not always lead to a reduction in the number of deaths from the disease. Some improvement is usually possible with the use of a more sensitive detection test, or by lowering the age for the first screening examination, or decreasing the period between examinations. However, the extent of behavior of the disease as well as by the rate at which the disease is detected without the screening examination, i.e., by the 'natural history' of the disease. The effectiveness of a periodic screening program is derived as a function of this natural history, the period between examinations, the sensitivity of the detection test, the age at the first examination, and the age distribution of the rate of the disease initiation in the screened population. A detailed discussion is given of how these results might be used to estimate the effectiveness of any planned periodic screening program. The analysis of a simple example suggests that for some diseases decreasing the interval between screening examinations may not lead to a significant lowering of the death rate, i.e., there may be a natural lower bound on the screening period.

3384. Statistical models for numbers of implantation sites and embryonic deaths in mice - McCaughran D.A. and Arnold D.W. - Cent. Quantitat. Sci., Univ. Washington, Seattle, Wash. 98195 USA - TOXICOL.APPL.PHARMACOL. 1976 38/2 (325-333)

The number of implantation sites and early and late embryonic deaths were recorded for 2131 Charles River mice. Several probability distributions were tried as models to describe the data. The negative binomial distribution was found to be an excellent model for embryonic deaths. None of the models fits the implantation site data precisely, but the normal distribution was found adequate.

3385. Public investment strategies for regional development: an analysis based on optimization and sensitivity results - Hanson D.A., Perkins W.R. and Cruz J.B. Jr. - Dept. City Reg. Planning, Ohio State Univ., Columbus, Ohio 43210 USA - IEEE TRANS.SYST.MAN CYBERN. 1976 SMC 6/3 (165-176)

Two strategies for regional development are analyzed: one with an emphasis on public investment in the region's infrastructure and the other with an emphasis on public investment in education and training. A growth model is presented which includes the effects of these public investment policy variables on productivity, private investment, and migration. Alternative public investment strategies are evaluated using a social welfare function. Optimization results indicate that a heavy emphasis on education and training is a better strategy, at least for the specific problem considered. The sensitivity of the policy variables is investigated with respect to model parameter values, the region's initial state, the tradeoff weights in the social welfare function, and the assumption that key model parameters are nonrandom. Assuming that a parameter is random implies the result that public investment in infrastructure should be slightly increased from a low nominal level.

3386. A research and development decision model incorporating utility theory and measurement of social values - Litchfield J.W., Hansen J.V. and Beck L.C. -

Battelle Pacific Northwest Lab., Richland, Wash. 99352 USA - IEEE TRANS.SYST.MAN,CYBERN. 1976 SMC 6/6 (400-410)

In the research and development environment, the classical decision model, even though modified to include multiple objectives or attributes, fails in the following ways. It uses linear attribute weighting functions. It does not incorporate uncertainty distributions in estimates of total value and attribute attainment. It does not facilitate group decision making. A computer assisted decision model has been developed to utilize decision analysis information more effectively. A hypothetical analysis of advanced nuclear waste management alternatives illustrates its application. A simulation technique predicts the preferred decision based on estimates of attribute levels, utility functions, and an evaluation of the relative importance of the attributes.

3387. Kinetics of channel gating in excitable membranes - Goldman L. - Dept. Physiol., Sch. Med., Univ. Maryland, Baltimore, Md. 21201 USA - QUART.REV.BIOPHYS. 1976 9/4 (491-526)

The g(Na) has properties quite different from those required by Hodgkin Huxley kinetics. The most significant experimental fact leading to this conclusion being, perhaps, the shear volume and diversity, both in type of preparation and type of experiment, of the evidence. The basis of these new properties seems to be that the g(Na) is governed by some multistate process, but the kinetic details, including the number of states, are not now known with any certainty.

3388. A random walk model of cellular kinetics - Rogers T.D. and Sampson J.R. - Dept. Mathemat., Univ. Alberta, Edmonton CAN - INT.J.BIOMED.COMPUT. 1977 8/1 (45-60)

The sorting out of biological cell mixtures into clusters of one cell type is modelled as a consequence of random cell and cluster motion, during which cells of like type cohere upon collision. After a description of the model and its motility rules, the results of several computer simulation studies are analysed and compared with both laboratory data and certain theoretical predictions. The model is found to be more biologically realistic than previous models with similar results. Suggestions for further research are discussed. An Appendix contains details about the data structures and algorithms employed in the simulation.

3389. Description of communication structures by means of communications theory (Germ) - ANWENDUNG DER KOMMUNIKATIONSTHEORIE ZUR BESCHREIBUNG VON KOMMUNIKATIONSSTRUKTUREN - Nonnenmacher W. - Inst. Nachrichtentechn., Techn. Univ., Munchen GFR - BIOL.CYBERN. 1977 25/2 (73-82)

The informational relationships between mutual coupled statistical systems can be lucidly described by making use of a communications theory, which is a generalization of Shannon's information theory. In groups with more than 2 systems interacting, which can be regarded as both information transmitters and receivers, information is not only solitarily produced by the particular systems, but also obtained by considering the combined behavior of more than one system. Finally, an example of communications theory application is presented. The statistical interrelationship between the index of stocks of 4 stock exchanges and the previous day's notations has been evaluated during a period of 3 yr and described by means of the communications theory.

3390. Fetal causes of the onset of labor. A kybernetic model (Germ) - FETALE URSACHEN DES WEHENEINTRITTS. EIN KYBERNETISCHES MODELL DES GEBURTSBEGINNS - Warkentin B. - Univ. Frauenklin., Freiburg i.Br. GFR - ARCH.GYNAK. 1977 222/1 (15-27)

The question of initiation of labor is not yet solved. A fetal fixing of the date would be ingenious. On the one hand the fetus is endangered by prematurity, on the other hand by placental insufficiency in postmaturity. Fetuses with a comparatively lighter placenta remain on average shorter in utero until spontaneous initiation of labor than those with a comparatively heavier placenta. This fact leads to the assumption of a relative placental insufficiency as a determining factor of the onset of labor. A further inquiry demonstrates, that babies born after premature termination of pregnancy about the term, either by induction of labor or by primary sectio cesarea, are heavier and longer than those born after spontaneous labor. This leads to the assumption of a prenatal weight loss of the infant before spontaneous initiation of labor. This weight loss is caused by diminution of water content and relative placental insufficiency. This relative placental insufficiency also leads to a diminution of amniotic fluid, which is swallowed by the 'hungry' fetus in a greater amount. Altogether a diminution of uterine volume results, which is accomplished by a diminution of uterine wall tension. The coordination of uterine activity, which precedes delivery, is combined with the ripening of the cervix. The ripening of the cervix also leads to a retraction of myometrium and thus to a further diminution of uterine wall tension. Is is concluded that a diminution of uterine volume, caused by fetal weight loss and diminution of amniotic fluid, leads to a reduction of uterine wall tension, which is supported by the ripening of the cervix. This reduction of uterine wall tension is the precondition of the increasing coordination of activity, which precedes delivery.

3391. A computer model of cell clone growth - Ransom R. - Sch. Biol. Sci., Univ. Sussex, Brighton ENG - SIMULATION TODAY 1977 No.48 (189-192)

A model simulating the growth of clones of cells in two dimensions is described. This model includes an algorithm that simulates the displacements which occur when interior cells divide in a cell mass; the nodel uses an algorithm which allows more realistic imulation than did previous models that did not ossess this facility. Applications of the model are liscussed, and details are given of the execution of he program on refresh display video, allowing lynamic observation of the modelled cell division rocess.

392. A compartmental model for the study of diurnal hythms in cell proliferation - Klein B. - Inst. ancerol. Immunogenet., Villejuif FRA - .THEOR.BIOL. 1977 64/1 (27-42)

A mathematical model taking into account the bserved diurnal variations in cell kinetics is resented. Its principle is to divide each phase of the ell cycle into a definite number of compartments nd to assume time dependent probabilities of ransition from one compartment to the following; eneral properties of the model are derived. The articular case where the only time dependent transition probabilities are those corresponding to the G_1 phase is studied. A characterization of the joint percentages of S and M cells variations is given. Th application of the model to interpretation of published experimental data obtained in hamster cheek pouch epithelium is given.

3393. On the biophysical interpretation of ageing factors (Germ) - ZUR BIOPHYSIKALISCHEN INTERPRETATION DER ALTERNSFAKTOREN - Beier W. - Inst. Biophys., Ber. Med., Karl Marx Univ., Leipzig GDR - AKTUEL.GERONTOL. 1977 7/1 (43-46)

The ageing factor is a measure of the rate of ageing. In the model of vitality the error rate μ corresponds to the ageing factor. The ageing factors of several physical functions can be determined from the increase or decrease of these functions. The standardized ageing factors of the physiological functions considered range from 0.001 to 0.017/year and are smaller than the ageing factor of the whole organism. The date of the occurrence of pathological manifestations as a result of age conditioned decrease of functions can be estimated by means of the ageing factors.

3394. A physical model for estimating body fat - Clark D.A. - USAF Sch. Aerospace Med., Aerospace Med. Div., Brooks AFB, San Antonio, Tex. 78235 USA - USAF SCH.AEROSPACE MED.REP. 1976 SAM-TR-76-41 (13p.)

This report describes a set of measurements of lengths, circumferences, and skinfold thickness by which to estimate the volume of fat in human subjects. The fat mass of seven body compartments is estimated and summed to obtain an estimate of the total body fat. Measurements were made on 61 young men. Body compositions computed from these measurements were compared with estimates made at about the same time using a body volumeter. Correlation coefficients for lean mass, fat mass, and percent body fat were 0.926, 0.845, and 0.756, respectively. Changes in fat mass estimated by the two methods were compared with the corresponding changes in body weight. Results from the anthropometric model were apparently as dependable as those obtained with the body volumeter. The anthropometric model is therefore considered acceptable for monitoring body composition when the composition can be checked occasionally with a body volumeter. Such a check is required to calibrate the anthropometric model, which tends to overestimate fat in lean men and underestimate it in fat men.

3395. Effect of lyophilization on the free radical states of animal cells - Ruuge E.K., Kerimov T.M. and Panemanglor A.V. - Phys. Fac., Lomonosov Moscow State Univ., Moscow USS - BIOPHYSICS (Oxford) 1976 21/1 (124-128)

A detailed comparison is made of the main characteristics of the EPR signal with g∞2.00 (width and form of the lines, g factors, relaxation parameters) of preparations lyophilized in vacuo and water containing preparations of different rat tissues. It is shown that the actual process of lyophilization (freezing, sublimation in vacuo) does not lead to changes in the free radical states of the cell. Only in the presence of a small amount of moisture and apparently oxygen do there appear those free radical centres which are usually recorded in lyophilically dried samples. These free radical centres are in fact artefact and are not components of the electron transport chain of the mitochondria and are localized outside the mitochondrial membrane.

3396. Model of the influence of the vestibular system on blood pressure during sleep - Doneshka P.I. and Toshev Yu.Ye. - Inst. Physiol., Bulgarian Acad. Scis, Sofia BUL - BIOPHYSICS (Oxford) 1976 21/1 (162-167)

A structural model of the influence of the vestibular system on blood pressure during sleep is proposed. The model takes into account the joint action of the otolith system and semicircular canals, the vestibular nuclei, the vasomotor centre, the nuclei of the vagus and also the central mechanism of the regulation of the wake-sleep state.

3397. On the influence of polyvalent ligands on membrane curvature - Hewitt J.A. - Nat. Inst. Med. Res., London ENG - J.THEOR.BIOL. 1977 64/3 (455-472)

The suggestion is made that a polyvalent ligand attached to a membrane will induce a curvature in that membrane which is concave toward the side to which that ligand is bound. This article presents a semiquantitative thermodynamic analysis predicting this effect for a simple system. The criterion for equilibrium of the ligand membrane complex is stated and for the simple system this is calculated for an arbitrary set of parameters. The influence of changes in these parameters is discussed. The energies calculated for this effect are of the order of 0.1 kcal/mol suggesting that for observable effects on curvature an array of such ligands will be needed. Some real systems in which this effect may be playing a role are discussed.

2.1. Fundamental concepts

3398. Generalization of Lotka - Volterra equation (Russian) (Russ) - Nazarenko V.G. - Inst. Biol. Phys., Ac. Sci. USSR, Pushchino USS - BIOFIZIKA 1976 21/1 (172-177)

A complete qualitative study of the Lotka Volterra model with cooperative interactions in the system predator prey is carried out. The character of all possible stationary states is investigated in the first quadrant of the phase plane of the model variables depending on the system parameters. It is shown that for the generalized model considered unstable and stable limit cycles only of the infinite amplitude are possible in the first quadrant.

3399. Centered differencing and the box scheme for diffusion convection problems - Lam D.C.L. and Simpson R.B. - Canada Cent. Inland Waters, Burlington CAN - J.COMPUTAT.PHYS. 1976 22/4 (486-500)

Two discretizations of a constant coefficient diffusion convection equation are compared. It is well known that to obtain acceptable results with centered differencing the spatial mesh size must be restricted in proportion to the strength of the convection. A similar restriction is shown to apply to the box scheme of H.B. Keller; however, a more quantitative examination of the two cases shows that the restriction is less severe for the box scheme. The errors in each are characterized by a false damping and phase shifting of solutions. It is shown that both effects are less prominent using the box scheme than using centered differences for problems with strong convection. The analysis is based on the observation that the box scheme can be viewed as having the same spatial discretization as the centered difference method, but with some spatial averaging of the temporal derivative. Such averaging features are commonly found in finite element methods also.

3400. Accurate and efficient quadrature for volterra integral equations - Knirk D.L. - Dept.Chem., Univ. California, Berkeley, Calif. 94720 USA - J.COMPUTAT.PHYS. 1976 21/4 (371-399)

Four quadrature schemes have been tested and compared in considerable detail to determine their usefulness in the noniterative integral equation method for single channel quantum mechanical calculations. They are two forms of linear approximation (Trapezoidal rule) and two forms of quadratic approximation (Simpson's rule). Their implementation in this method is shown, a formal discussion of error propagation is given, and tests are performed to determine actual operating characteristics on various bound and scattering problems in different potentials. The quadratic schemes are generally superior to the linear ones in terms of accuracy and efficiency. The previous implementation of Simpson's rule is shown to possess an inherent instability which requires testing on each problem for which it is used to assure its reliability. The alternative quadratic approximation which the authors propose does not suffer this deficiency, but still enjoys the advantages of higher order. In addition, the new scheme obeys very well an h Richardson extrapolation, whereas the old one does so rather poorly.

3401. Feedback information rate and entropy in a discrete system - Langholz G. and Sekey A.A. - Sch. Engin., Tel Aviv Univ., Ramat Aviv ISR - INT.J.SYST.SCI. 1976 7/9 (963-971)

A multi state deterministic system controlled via a noisy Binary Symmetric Channel (BSC) is modelled by an equivalent Markov chain. The system performs a random walk whose mean deviation from zero is numerically equal to the expected number of steps between zero crossings, and whose entropy is equal t the average amount of transmitted control information between zero crossings. Simple expressions are found for the received control information and for the mutual information via the BSC.

3402. Forecasting based on time series with correlated errors by information preserving filter. Demand forecasting from information theory - Ohta H., Noda H. and Kase S. - Dept. Industr. Engin., Coll. Engin., Univ. Osaka Pref., Mozu Umemachi, Sakai JAP - INT.J.SYST.SCI. 1976 7/7 (779-790)

An optimal forecasting technique has been developed by us from the viewpoint of mutual information. Generalization of this process is considered for the time series with correlated errors. The recommended technique is also compared with the prevailing method based on the Kalman filter in t the optimality. The results indicate that the former may improve the latter in the effectiveness of forecasting.

3403. Transformation system with time dependent characteristics and population theory - Delattre P. - Dept. Biol., Cent. Etud. Nucl. Saclay, Gif sur Yvette FRA - MATH.BIOSC. 1976 32/3-4 (239-274)

The theory of transformation systems can be applied to population models if allowance is made fo certain particular relations which arise because the time is no longer merely an independent reference variable but also a defining property of the classes when the age of the elements has to be taken into account. It is easy to convert the differential formalism used in the theory of transformation systems to the recurrence or discrete formalism often used in population theory in the form of Leslie matrices. The use of this recurrence formalism may lead to artifacts of calculation because of the implici approximations involved. It follows that in population theory the choice between differential and recurrence formalisms is not a minor or irrelevant question; in practice, the former have a much wider range of validity than the latter. The question of stability properties in the differential or discrete formalisms, respectively, has often been put forward for example by R.M. May and P. Van den Driessche Here another aspect of the correspondence between e two formalisms, namely the partition of the bjects studied into various equivalence classes is articularly emphasized. This problem of the quivalence classes needed to represent the properties f a system is treated, using the criteria regarding egrouping of classes established elsewhere. It is hown that the type of reproduction of the organisms onsidered must be explicitly taken into account in opulation models.

404. Robustness of the Pearson correlation against iolations of assumptions - Havlicek L.L. and eterson N.L. - Sch. Educ., Univ. Kansas, Lawrence, ans. 66045 USA - PERCEPT.MOTOR SKILLS 976 43/3II (1319-1334)

The purpose of this study was to determine mpirically effects of the violation of assumptions of ormality and of measurement scales on the Pearson roduct moment correlation coefficient. The effects of uch violations were studied separately and in ombination for samples of varying size from 5 to 60. Monte Carlo procedures were used to generate opulations of scores for four basic distributions: normal, positively skewed, negatively skewed, and eptokurtic. Samples of varying sizes were then andomly selected from specific populations. Results f the study were based on distributions of rs which were calculated on 5,000 sets of samples of $n=5$ or $n=15$ and 3,000 sets of samples of $n=30$ and $n=60$. Results indicated that the Pearson r is insensitive to ather extreme violations of the basic assumptions of normality and type of measurement scale. Failure to meet the basic assumptions separately or in combinations had little effect upon the obtained distributions of rs.

2.2. Mechanical systems

3405. Mechanical properties of bone cements containing large doses of antibiotic powders - Lautenschlager E.P., Jacobs J.J., Marshall G.W. and Meyer P.R. Jr - Dept. Biol. Mater., Northwest. Univ., Chicago, Ill. 60611 USA - J.BIOMED.MAT.RES. 1976 10/6 (929-938)

The addition of up to 10 g gentamicin sulfate antibiotic powder to 60 g units of Simplex P acrylic bone cement caused gradual, proportional decreases in the bulk mechanical properties of compressive and diametral tensile strengths. Water leaching of the antibiotic from the cement did not significantly decrease these strengths. Scanning electron microscopy (SEM) and energy dispersive x ray spectroscopy (EDS) showed the antibiotic to reside in the acrylic matrix as discrete particles not usually associated with internal porosity. The surface sensitive flexural strength of a proprietary bone cement was lowered immediately by small quantities of antibiotic powder, and continued to decrease as doses of up to 10 g/unit were admixed. Water leaching caused channeling as the antibiotic was removed from the surface, but it did not create further changes in flexural strength.

3406. In vitro measurement of bone acrylic interface pressure during femoral component insertion - Markolf K.L. and Amstutz H.C. - Div. Orthop. Surg., UCLA Sch. Med., Los Angeles, Calif. 90024 USA - CLIN.ORTHOP. (Phila.) 1976 No. 121 (60-66)

Bone acrylic interface pressure measurements were recorded at the medial interior rasped surfaces of fresh cadaver femurs during digital packing of acrylic bone cement and during insertion and seating of a Trapezoidal 28 femoral total hip component. Plugging of the femoral canal below the tip of the prosthesis stem was an effective means for increasing pressure in the distal femoral canal when the stem was inserted in the early stages of acrylic polymerization (i.e., immediately after dough time). At surgery, this can be accomplished by inserting a small bolus of acrylic down the canal to a depth below the tip of the seated stem and allowing it to polymerize in place. This forms an effective seal which prevents distal extrusion of the acrylic when the cavity is then packed prior to prosthesis insertion. Elimination of cement in the distal canal also avoids any future difficulty of acrylic removal should revision become necessary due to loosening or infection. No significant pressure differences were observed between one and two millimeter thicknesses of acrylic between the metal and bone. Interface pressures developed during finger packing were of the same order of magnitude as those achieved during seating of the femoral component. Use of a rubber diaphragm stretched tightly over the margins of the rasped femoral cavity helped to contain the acrylic and prevent extrusion during finger packing but was ineffective in increasing interface pressure. When this method is used, the acrylic can be poured or injected into the canal and packed before dough stage and thus faciliate increased cancellous penetration when the acrylic is in a state of low viscosity.

3407. A myocybernetic control model of skeletal muscle - Hatze H. - Nat. Res. Inst. Mathemat. Sci., CSIR, Pretoria SAF - BIOL.CYBERN. 1977 25/2 (103-119)

A mathematical model of skeletal muscle is presented which contains the two physiological control parameters stimulation rate and motor unit recruitment. The model is complete in the sense that it adequately describes all possible contractive states normally occurring in living muscle. The modelling procedure relies entirely on established myo physiological facts and each assumption made is substantiated by experimental data. Extensive simulation studies reveal that the model is capable of correctly predicting practically all known phenomena of the muscular force output. A simplified version of the model is also presented, particularly suitable for inclusion as the driving structure in complex musculoskeletal link systems. This version was successfully tested in the prediction of an optimal human motion. The present control model is believed to fill a gap in the literature on models of muscle, and may be expected to provide a sound basis for research into the optimal control aspects of muscular contraction, and to stimulate such research.

3408. Biomechanics of vertebral segments; clinical and prognostical interpretations (Germ) - BIOMECHANISCHES VERHALTEN DER WIRBELSAULE SEGMENTE; KLINISCHE UND PROGNOSTISCHE BEDEUTUNG - Rizzi M.A., Covelli B., Bivetti J. and Luethi B. - FMH Rheumaerkrankungen, Zurich SWI - ARCH.ORTHOP.UNFALL-CHIR. 1977 87/1 (111-116)

The authors propose a new model to estimate the forces of the intrinsic equilibrium of the segment. Based on the theory of the so called transient pole, it became possible to describe the momentary movement of an angle relative to its neighbour and to define the way of the intrinsic equilibrium. This transient pole fixes the centre of rotation around which the upper angle moves relative to the lower vertebral body. Normal and pathological cases can be diagnosed at once by use of a special rontgenological appliance in connection with the statistical experience. It becomes possible to calculate the forces and movements acting on a segment.

3409. A three element description for muscle with viscoelastic passive elements - Glantz S.A. - Cardiol. Div., Univ. California, San Francisco, Calif. 94143 USA - J.BIOMECH. 1977 10/1 (5-20)

This paper explores the implications of expanding Hill's three element model by replacing the series and parallel elastic elements with nonlinear viscoelastic elements. The resulting model includes a contractile element whose shortening relates not to a mechanical length, but to the number of active cross bridges. Given this interpretation, the contractile element behaves in qualitatively agreement with known sarcomere biophysics. It also explains why one cannot vary maximum tetanic force and maximum shortening velocity independently in skeletal muscle, why cardiac muscle fails to exhibit hyperbolic force velocity curves and why the curve's shape depends on how one obtains the curve. This analysis also shows that the classical formula for contractile element velocity, V(CE)(t) = p/(KP + C), actually gives initial muscle shortening velocity for a twitch that begins shortening at time t, not contractile element velocity. This model suggests a simple hypothesis to relate the inotropic agents action at a subcellular level to the mechanical events and permits indexing inotropic state at constant muscle length with one parameter. These results follow from replacing the two purely elastic elements with viscoelastic ones; they would still follow even if the exact formulation proposed for the viscoelastic element was wrong.

3410. The effects of variable mass and geometry, pretwist, shear deformation and rotatory inertia on the resonant frequencies of intact long bones: a finite element model analysis - Orne D. and Young D.R. - Dept. Mech. Engin., Wayne State Univ., Detroit, Mich. 48202 USA - J.BIOMECH. 1976 9/12 (763-770)

The influence of pretwist, nonuniformities in mass and flexural stiffness, rotatory inertia and shear deformation on the natural frequencies of intact bones is evaluated by means of a linear elastic, finite element model which has been programmed for solution on the digital computer. Theoretical results are compared to the results on the forced vibration of intact canine radii obtained experimentally by Thompson. Surprisingly, inclusion of fairly large pretwist angles (from -14 to 12 for one specimen) had little effect on the first three frequencies of transverse vibration in either the cranial or lateral directions. Inclusion of shear deformation reduced the third mode frequency in the stiffest (lateral) direction by about six per cent, otherwise shear deformation played a minor role in determining natural frequencies. Similarly, rotatory inertia had negligible influence up to the third natural frequency. The predominant influence on the first three natural frequencies of transverse vibration could be attributed to the variations in mass and flexural stiffness along the length of the test specimens. Different effective moduli of elasticity are required to yield correct absolute values for the frequencies which correspond to experimental findings, thus implying the presence of some inhomogeneities in material properties around the bone cross section and/or along its length.

3411. Flexural wave propagation in discontinuous model and in vitro tibiae - Wong A.T.C., Goldsmith W. and Sackman J.L. - Coll. Engin., Univ. California, Berkeley, Calif. 94720 USA - J.BIOMECH. 1976 9/1 (813-825)

The change in the characteristics of propagating flexural waves due to the introduction of a discontinuity in an aluminium beam representing a zero order model of a fractured human tibia and of an in vitro tibia was investigated. It was found that amplitudes of the transmitted waves decreased linearly, while reflected waves increased with the depth of cuts simulating a partial fracture for both types of specimen above a certain threshold. Completely severed segments reglued by silicone rubber transmitted only small amplitude and low frequency flexural waves. The experimental data for the beam tests generally agreed with the results of a corresponding finite element analysis based on the Euler Bernoulli equation, although some of the important details were absent in the prediction. Transverse impact tests were also performed on in vitro tibiae in an intact state, in a fractured state, and in a condition having a surgical compressional plate mounted across the fracture site. The resultant wave forms were different from those of the beam because of dissimilar geometrical configurations and material properties. These tests provided some basic data that might find application in the possible use of flexural waves as a diagnostic tool for the assessment of the state of healing of fractured long bones.

3412. Open loop analysis of a feedback mechanism controlling the leg position in the stick insect Carausius morosus: measurements of the forces produced by the flexor and extensor tibiae muscles (Germ) - SYSTEMANALYTISCHE UNTERSUCHUNG EINES AUFGESCHNITTENEN REGELKREISES, DER

IE BEINSTELLUNG DER TABHEUSCHRECKE CARAUSIUS MOROSUS ONTROLLIERT: KRAFTMESSUNGEN AN EN ANTAGONISTEN FLEXOR UND XTENSOR TIBIAE - Storrer J. and Cruse H. - achber. Biol., Univ. Kaiserlautern GFR - IOL.CYBERN. 1977 25/3 (131-142)

In the leg of the stick insect Carausius morosus here exists a feedback loop which controls the osition of the femur tibia joint (Baessler, 1965). This edback mechanism is broken to investigate the open op system. As output the forces of the two ntagonistic muscles flexor tibiae and extensor tibiae re measured separately. As input the feedback ansducer of the control mechanism, a chordotonal rgan, is stimulated by different kinds of input unctions: sine, step, delta, rectangular and ramp unctions. As a qualitative result one can say, that oth the 'flexor system' and the 'extensor system' ave rectifying and high pass filter properties. Iowever, the comparison between responses to ifferent input functions show that the quantitative roperties of this highpass filter change very strongly ith the shape of the input function. Therefore the xistence of different nonlinearities has to be ssumed.

413. Open loop analysis of a feedback mechanism ontrolling the leg position in the stick insect Carausius morosus: comparison between experiment and simulation - Cruse H. and Storrer J. - Fachber. Biol., Univ. Kaiserslautern GFR - BIOL.CYBERN. 977 25/3 (143-153)

In the legs of the stick insect Carausius morosus a eedback mechanism exists to control the value of the ngle between femur and tibia. It is possible to nvestigate the open loop system by moving as input xperimentally the receptor apodeme of the femoral hordotonal organ, which acts as feedback transducer neasuring the angle between femur and tibia Bassler, 1965). As output the forces are measured separately which are developed by the two antagonistic muscles moving the femur tibia joint. The response of this system to different step, sine, ramp and δ functions are measured. An electronic analog model is constructed to simulate the biological system. Although a number of different nonlinearities arise in the biological system, as a first order approximation the model fits the experimental results sufficiently. The main characteristics of the model are as follows follows. consists of two independent subsystems, the 'flexor system' and the 'extensor system'. Each subsystem again consists of two parallel branches with high pass properties of different time constants. In each subsystem one branch is only excitable by input functions of a slope smaller than a certain degree. It is remarkable, that no mutual inhibitory influence between the subsystems controlling the antagonistic muscles is necessary in the model.

2.3. Heat and thermodynamics

3414. Mathematical treatment of structure and function of the human thermoregulatory system - Werner J. - Inst. Physiol., Ruhr Univ., Bochum GFR - BIOL.CYBERN. 1977 25/2 (93-101)

The mathematical system analysis of structure and function of the human thermoregulatory system is introduced and compared to simplifying modelling techniques. In an adequate treatment the principle of locally and time dependent variables and parameters is taken into account. The complete equations are given in such a way that reference signals are not necessary. The problem of the set point is discussed. On the basis of a series of preliminary simplifications first results are presented concerning system states under open and closed loop conditions, effectiveness of the controller and dynamics of radial temperature profiles. Quasistationary and dynamical experimental results are added for comparison. The results encourage the author to continue the realisation of the complete system without the preliminary simplifying assumptions.

3415. Thermal responses to high frequency electromagnetic radiation fields - Frazer J.W., Merritt J.H., Allen S.J. et al. - USAF Sch. Aerospace Med., Aerospace Med. Div., Brooks AFB, San Antonio, Tex. 78235 USA - USAF SCH.AEROSPACE MED.REP. 1976 SAM-TR-76-20 (16p.)

Monkeys were exposed to fields of 1000, 750, and 500 mW/cm^2 at 26 MHz in a coaxial transmission line for 6 hours. An immediate rise in skin and rectal temperature, with subsequent cooling, was noted. Rectal temperature reached an equilibrium after about 1.5 hours of exposure. This equilibrium was maintained throughout the remainder of the exposure period. Thermoregulatory mechanisms activated as a result of exposure to even the highest power (1000 mW/cm^2) appear adequate dissipate disspate the imposed heat load.

3416. Calculation of intratumor temperature in a heated superficial tumor - Yerushalmi A. - Radiat. Unit, Weizmann Inst. Sci., Rehovot ISR - T.I.T.J.LIFE SCI. 1976 6/1-2 (35-39)

Measurements of intratumor temperature build up in locally heated superficial tumor in the footpads of mice were analyzed. The intratumor temperature rise was found to consist of two slopes before the temperature reached a steady state. An empirical equation was developed, allowing a close estimate of the intratumor steady state temperature.

2.4. Bioacoustics

3417. Light scattering heterodyne interferometer for vibration measurements in auditory organs - Dragsten P.R., Webb W.W., Paton J.A. and Capranica R.R. - Sch. Appl. Engin. Phys., Cornell Univ., Ithaca, N.Y. 14853 USA - J.ACOUST.SOC.AMER. 1976 60/3 (665-671)

An interferometric optical heterodyne technique has been developed especially for vibrational amplitude and phase measurements on auditory organs of live animals. Laser light diffusely scattered from the vibrating structure is used for the measurement. Continuous calibration and feedback compensation systems were developed to cope with the problems of drift in interferometer alignment and small background movements. Vibrational amplitudes from below 0.1 Ato above 400 Ahave been detected on the posterior tympanic membranes of live crickets.

3418. A high resolution vision system for aircraft and trainers - Lewis E. and Amos B. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (430)

This new type of head mounted vision system uses an Eye Tracking Helmet Mounted Display (ETHMD) with a high resolution area that approximates the eye resolution and is servo controlled so that the high resolution area remains centered on the eye line-of-sight (LOS). The ETHMD input can be imagery from a servo controlled dual electro-optical (EO) sensor and/or computer generated imagery (CGI). The High Resolution Vision System (HRVS), consisting of the ETHMD together with the servo controlled EO sensor and/or CGI, acts as though it were a part of the eye. Targets can be seen to ± 160 degrees in azimuth and ± 110 degrees in elevation because the display and sensors follow the LOS. The binocular and monocular instantaneous horizontal fields of view (FOV) are 40 degrees and 25 degrees respectively. Aircraft applications include computer generated displays that appear fixed in the cockpit, targets designated by 'looking' and pseudo-visual ground contact for low level night flight. The HRVS is also applicable to flight trainers, resulting in a lightweight, wide viewing volume, high resolution system that has essentially no impact on the cockpit.

3419. Human factors analysis of symbology for ECM display - Robinson J.D. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (429-430)

This paper presents the human factors analysis that defines the alphanumeric and special symbols to be used on the Electronic Display Units (EDU) of the B 1 defensive systems. In order to ensure rapid, accurate response to threat situations, the symbol set is required to be both easily discriminative and highly meaningful. Symbol selection resulted from the evaluation of two empirical tests. The first consisted of a static evaluation in which subjects were serially presented with test symbols in the center of a Cathode Ray Tube (CRT). The second employed a dynamic display where symbols would pop up in dense moving environment. Dependent measures for both tests consisted of identification accuracy and verbal reaction time.

3420. Low pass, spatially filtered fourier Walsh transforms as a metric for human pattern perception - Goble L.G. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (429)

A pattern recognition machine employing a low pass spatially filtered, two dimensional discrete fourier (2 DDFT) or Walsh transform (2 DDWT) has successfully classified hand printed alphabetic characters. Using the set of coefficients that represent the decomposition of each character, a Euclidian distance may be obtained between each letter in the transform space and every other letter. This Euclidian distance is tested to determine if it is correlated to the errors a subject would make in a forced choice, self paced, recognition task. A correlation method previously used by Conrad (1964) produced a +.77 Spearman Rank correlation between Fourier interprototype distances and subjects mean recognition errors.

3421. Non linearity of the basilar membrane - Novoselova S.M. - Pavlov Inst. Physiol., USSR Acad. Sci., Leningrad USS - BIOPHYSICS (Oxford) 1976 21/1 (140-145)

A non linear correction in the equation of the vibration of the basilar membrane becomes the main determining part of the equation of the resonance cross section. The periodic solution with a frequency of the acting force ω close to the resonance section has a region of instability in the interval $\omega \varepsilon [\omega\infty, \omega\infty \{1 + O(a'/h')\}]$, where a is the amplitude of the vibration and h is the membrane thickness. The jump into the region of instability is possibly a stimulus exciting the hair cell.

2.5. Biooptics

3422. Speaker recognition using orthogonal linear prediction - Sambur M.R. - Bell Lab., Murray Hill, N.J. 07974 USA - IEE TRANS.ACOUST.SPEECH SIGN.PROC. 1976 24/4 (283-289)

Recent experiments in speech synthesis have shown that, by an appropriate eigenvector analysis, a set of orthogonal parameters can be obtained that is essentially independent of all linguistic information across an analyzed utterance, but highly indicative of the identity of the speaker. The orthogonal parameters are formed by a linear transformation of the linear prediction parameters, and can achieve their recognition potential without the need of any time normalization procedure. The speaker discrimination potential of the linear prediction orthogonal parameters was formally tested in both a speaker identification and a speaker verification experiment. The speech data for these experiments consisted of six repetitions of the same sentence spoken by 21 male speakers on six separate occasions. For both identification and verification, the recognition accuracy of the orthogonal parameters exceeded 99 percent for high quality speech inputs. For telephone inputs, the accuracy exceeded 96 percent. In a separate text independent speaker identification experiment, an accuracy of 94 percent was achieved for high quality speech inputs.

3423. A comparison of several speech spectra classification methods - Silverman H.F. and Dixon N.R. - Speech Processing Group, Computer Sci.Dept., IBM Thomas J.Watson Res.Cent., Yorktown Heights, N.Y. 10598 USA - IEEE TRANS.ACOUST.SPEECH SIGN.PROC. 1976 24/4 (289-295)

An important consideration in speech processing involves classification of speech spectra. Several methods for performing this classification are discussed. A number of these were selected for comparative evaluation. Two measures of performance, accuracy and stability, were derived through the use of an automatic performance evaluation system. Over 3000 hand labeled spectra were used. Of those evaluated, a linearly mean corrected minimum distance measure, on a 40 point spectral representation with a square (or cube) norm was consistently superior to the other methods.

3424. The efficient display of electro optical imagery - Gagnon R.A. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (429)

Many remote systems require the use of electro optical sensors and television displays. These systems require a wide bandwidth and a high ratio of picture element transmitted to picture element used. These two requirements exist because of inability of system designers to specify what information in a visual scene is important to the operator. A model of the human visual system (HVS) is used to identify prospective objects of interest in a visual scene. The approach is to use a coarse (peripheral vision) scan of the field of view, apply the HVS model to emphasize prospective objects, and apply a high resolution (foveal) scan to each prospective object. The procedure was applied to a set of photographs in which 89% of the targets were detected using only 5% of the resolution elements required in a 512 line television system.

3425. Picking out patterns with logic cells - Duff M.J.B. - Dept. Phys. Astronomy, Univ. Coll., London ENG - SPECTRUM (London) 1976 No. 146 (2-5)

Extending automation to the recognition of patterns would not at first seem to be particularly difficult. It would be a valuable aid to inspection in manufacturing processes and would speed up analysis of star maps, for example. It might be applied wherever the structure of data, rather than the individual items, carries the significant information. But serial computing to do this may be prohibitively lengthy and unwieldy, so speedier and more economical techniques are being evolved to do a great deal of the necessary processing in parallel, in much the same way that the human visual system operates. Logic cells for use in special arrays are being developed for the task.

3426. Rhodopsin in model membranes: Charge displacements in interfacial layers - Trissl H.W., Darszon A. and Montal M. - Dept. Bioquim., Cent. Invest. Estud. Av., Inst. Politecn. Nac., Mexico MEX - PROC.NAT.ACAD.SCI.USA 1977 74/1 (207-210)

A model membrane was developed in which interfacial layers of rhodopsin were reoriented onto one side of a thin Teflon film separating two aqueous compartments. Flashes evoked fast photoelectric signals (1 ms) that originated from capacitative charge displacements of oriented rhodopsin upon bleaching. The photoelectric responses of rhodopsin in the model membrane are compared with the early receptor potential of photoreceptor cells; it is then concluded that the signals in both systems originate from the same mechanism.

3427. The effect of hard and soft contact lenses (Soflens(TM)) on the spherical aberration of the human eye - Woo G.C.S. and Sivak J.G. - Sch. Optometry, Univ. Waterloo CAN - AMER.J.OPTOM.PHYSIOL.OPT. 1976 53/9(I) (459-463)

An attempt was made in this study to determine experimentally the relative effects of hard and soft contact lenses on the spherical aberration of the human eye. Results of this study indicate that there is very little difference in the value of spherical aberration between wearing soft or hard contact lenses.

3428. On the classification of visual patterns: systems analysis using detection experiments - Fansa M. and Von Seelen W. - Inst. Zool., Johannes Gutenberg Univ., Mainz GFR - BIOL.CYBERN. 1977 25/3 (121-130)

Behavioral experiments are indispensable for the analysis of biological systems for cognition and recognition. When these are carried out as detection experiments three types of description can be used for the problem of visual pattern recognition which allow conclusions to be drawn on the operating function of the system. Provided that the signals to be recognized have additive noise superimposed on them, system description is possible: on the basis of the probabilities of recognition and of mix up; through the analysis of the transformation of distribution densities of the noise; and by means of the measurable distances of the patterns from each other in feature space. The analysis of the distribution densities shows that the human visual system acts like a linear classifier in the classification of six geometrical patterns. The independence of the classification from intensity as well as the human reaction to alteration in the power spectrum of the noise support this result. Simulation experiments on a computer show the efficacy of various biological relevant parameters for the linear classification and suggest that a narrow band and probably feature specific filtering precedes the classification.

2.6. Gas physics

3429. A physical model of time dependent flow in the human air passages - Chauvet G. and Tuchais E. - Lab. Biol. Methemat., Clin. Pneumophtisiol., UER Sciences Med., Angers FRA - INT.J.BIOMED.COMPUT. 1977 8/1 (21-34)

A physical model of the time dependent, homogeneous, viscous and incompressible flow in the first 12 bronchial branches is described. The anatomical data given by Weibel (1963) are used. By means of these hypotheses the following equation was obtained $P(alv)(t) = K.V'(B)(+) + K\ V(B)(t)$, where k and k are constants which depend on bronchial geometry and P(alv)(t) and V(B)(t) are the alveolar pressure and the mouth flow rate, respectively. Some measur erning laterobronchial pressure and co are given.

Fluid flow systems

3430. Fluid exchange from a microoccluded capillary with axial variation of filtration parameters - Blake T.R. and Gross J.F. - Syst. Sch. Software, La Jolla, Calif. 92038 USA - BIORHEOLOGY 1976 13/6 (357-366)

A mathematical analysis is presented of transcapillary fluid exchange during microocclusion of a single capillary, wherein both the capillary filtration coefficient and the tissue hydrostatic and osmotic pressure are dependent upon the axial distance along the capillary. In this model, the plasma is assumed to comprise an incompressible viscous fluid with the protein being a dilute solute in the fluid; the authors neglect the presence of erythrocytes. A system of one dimensional, time dependent equations describes the motion of this fluid including the influences of both fluid filtration and solute transport. Within the context of this model, the authors interpret in vivo data from microvascular experiments on occluded capillaries and infer the relative merits of experimental methods to diagnose axial variations in capillary filtration parameters.

3431. The effect of variable capillary radius and filtration coefficient on fluid exchange - An K.N. and Salathe E.P. - Cent. Applicat. Mathemat., Lehigh Univ., Bethlehem, Pa. 18015 USA - BIORHEOLOGY 1976 13/6 (367-378)

A previous analysis of fluid movement across capillary walls is extended to the physiologically more realistic case of variable capillary radius and filtration coefficient. Although the mathematical problem is considerably more complex, a method of solution is suggested by the results of the earlier study. An asymptotic solution is obtained which provides accurate results for most conditions of physiological interest.

3432. Solute concentration in the kidney. I. A model of the renal medulla and its limit cases - Jacquez J.A., Foster D. and Daniels E. - Dept. Physiol., Med. Sch., Univ. Michigan, Ann Arbor, Mich. 48109 USA - MATH.BIOSC. 1976 32/3-4 (307-335)

The authors developed a general model of the renal medulla that is similar in geometry to the models reported by others. Two solutes are assumed to be present, one to play the role of salt and the other that of urea and similarly handled compounds. The equations from irreversible thermodynamics are used to describe simultaneous solvent and solute flow across tubular membranes and a salt pump, saturable in the cis concentration and inhibited by trans concentrations is included in the AHL. We examined the input limit cases of the model, i.e., those for zero and infinite inflows in vasa rectae, Henle loop and collecting ducts. High inflow to vasa rectae washes out the gradients. For inflow to DHL there is an optimal value for building up the concentration gradients: for zero inflow, no concentration gradients are developed and as inflow increases above the optimal value, the concentration gradients decrease and all concentrations in DHL, AHL and interstitium tend towards those in the inflow to DHL. A central core model, the limit case for zero inflow in vasa rectae, is then described.

3433. Experimental study of finite amplitude pulsatile pressure waves in elastic tubes - Lou Y.S. - Dept. Mech. Aerospace Engin., Univ. Delaware, Newark, Del. 19711 USA - J.BIOMECH. 1976 9/12 (747-753)

An experimental study of the propagation of pulsatile pressure waves in an elastic tube was made and results were compared to a theoretical analysis by Lou. The pressure waves were sinusoidally varying acting in a horizontal, longitudinally constrained tube containing water. The independent experimental parameters varied were the pressure wave frequency pressure wave volume per cycle, static tube pressure and steady flow rate. The wave propagation speeds measured by non intrusive techniques, were found to be functions of the wave frequency and the phase angles of the wave elements as theoretically predicted by Lou.

2.8. Electrical systems

3434. Note on a Markov chain approach to cardiac arrhythmia classification - White C.C. III - Dept. Appl. Mathemat. Computer Sci., Univ. Virginia, Charlottesville, Va. 22901 USA - COMPUTERS BIOMED.RES. 1976 9/6 (503-506)

A heart beat interval, Markov chain approach to cardiac arrhythmia classification is reexamined, and an alternative problem formulation presented. The approach developed models heart beat interval and underlying disorder as a partially observed, two dimensional Markov chain, where the scalar element modeling underlying disorder is assumed to always make transition back into the same state. The R R wave interval is assumed perfectly observed and the underlying disorder completely unobserved. A recursive procedure for updating the probability density of an underlying disorder conditioned on all past data is stated. Selection of the classification which maximizes the probability of being the underlying disorder, given the observed sequence, is then easily determined.

3435. Analysis and simulation of double layer neural networks with mutually inhibiting interconnections - Tokura T. and Morishita I. - Fac. Engin., Univ. Tokyo JAP - BIOL.CYBERN. 1977 25/2 (83-92)

Double layer neural networks with mutually inhibiting interconnections are analyzed using a continuous variable model of the neuron. The first layer consists of excitatory neurons while the second layer consists of inhibitory neurons. Both feedforward and feedback interconnections exist between the two layers. An autonomous system of nonlinear differential equations is introduced to describe the network dynamics, and the stability conditions for some classes of equilibria are investigated in detail.

Several simulation results are also presented. It is shown that even those networks which are formed with rather powerless synapses are capable of carrying out input pattern sharpening, temporary information storage, and periodic signal generation.

436. Steady state electrodiffusion: Scaling, exact solution for ions of one charge, and the phase plane - Leuchtag H.R. and Swihart J.C. - Dept. Phys., Indiana Univ., Bloomington, Ind. 47401 USA - BIOPHYS.J. 1977 17/1 (27-46)

This is the first of 2 papers dealing with electrodiffusion theory (the Nernst Planch equation coupled with Gauss's law) and its application to the current voltage behavior of squid axon. New developments in the exact analysis of the steady state electrodiffusion problem presented here include a scale transformation that connects a given solution to an infinity of other solutions, suggesting the possibility of direct comparison of electrical data for membranes with different thicknesses and other properties; a first integral relation between the electric field and ion densities more general than analogous relations previously reported, and an exact solution for the homovalent system, i.e., a membrane system permeated by various ion species of the same charge. The latter is a generalization of the known one-ion solution. The properties of the homovalent solution are investigated analytically and graphically. In particular the authors study the phase plane curves, which reduce to the parabolas discussed by K.S. Cole in the special case in which the current density parameter (a linear combination of the ionic current densities) is zero.

3437. Electrical properties of frog skeletal muscle fibers interpreted with a mesh model of the tubular system - Mathias R.T., Eisenberg R.S. and Valdiosera R. - Dept. Physiol., UCLA Med. Sch., Los Angeles, Calif. 90024 USA - BIOPHYS.J. 1977 17/1 (57-93)

This paper presents the construction, derivation, and test of a mesh model for the electrical properties of the transverse tubular system (T system) in skeletal muscle. The authors modeled the irregular system of tubules as a random network of miniature transmission lines, using differential equations to describe the potential between the nodes and difference equations to describe the potential at the nodes. The solution to the equations can be accurately represented in several approximate forms with simple physical and graphical interpretations. All the parameters of the solution are specified by impedance and morphometric measurements. The effect of wide circumferential spacing between T system openings is analyzed and the resulting restricted mesh model is shown to be approximated by a mesh with an access resistance. The continuous limit of the mesh model is shown to have the same form as the disk model of the T system, but with a different expression for the tortuosity factor. The physical meaning of the tortuosity factor is examined, and a short derivation of the disk model is presented that gives results identical to the continuous limit of the mesh model. Both the mesh and restricted mesh models are compared with experimental data on the impedance of muscle fibers of the frog sartorius. The derived value for the resistivity of the lumen of the tubules is not too different from that of the bathing solution, the difference probably arising from the sensitivity of this value to errors in the morphometric measurements.

3438. Experimental and theoretical studies on electromagnetic fields induced inside finite biological bodies - Guru B.S. and Chen K.M. - Dept. Electr. Engin. Syst. Sci., Michigan State Univ., East Lansing, Mich. 48824 USA - IEEE TRANS.MICROWAVE THEORY TECH. 1976 24/7 (433-440)

The total electric field inside some simulated biological bodies induced by an electromagnetic wave has been quantified by the recently developed tensor integral equation method and measured by an insulated probe. In general, the induced electric field inside a biological body was found to be quite complicated. An excellent agreement was obtained between theory and experiment.

3439. Neuronal models, spike trains, and the inverse problem - Sclabassi R.J. - Dept. Biomathemat., Sch. Med., UCLA, Los Angeles, Calif. 90024 USA - MATH.BIOSC. 1976 32/3-4 (203-219)

This paper examines the inverse problem in relation to observed neuronal spike train data and physiological hypotheses concerning the underlying mechanisms responsible for the production of the observed data. The problem is formulated as consisting of four subproblems: characterization of the experimental data, development of the mathematical model, optimization of the physiological parameters, and statistical testing of the theoretical and experimental data. Two case studies are examined, one using pacemaker data recorded from Aplysia californica, the other data recorded from the nucleus cuneatus of a cat.

3440. Characterization of dynamical behavior associated with a single neural equation - Nagami H., Kitahashi T. and Tanaka K. - Fac. Engin. Sci., Osaka Univ., Toyonaka/Osaka JAP - MATH.BIOSC. 1976 32/3-4 (221-237)

The authors deal with the characteristics of the dynamical behavior of a single neural equation. They discuss them in connection with the pattern of coupling coefficients of the neuron. With respect to the existence of the stable configurations and the reverberation cycles they discuss the characteristics of the process of conversion to the stable configurations and investigate the characteristics of the reverberation cycles. They consider the length and the number of reverberation cycles under a particular restriction on the coupling coefficients.

3441. Analysis of a model for the crustacean cardiac pacemaker - Plant R.E. - Dept. Mathemat., Univ. California, Davis, Calif. 95616 USA - MATH.BIOSC. 1976 32/3-4 (291-305)

A dimensionless version of a dynamic model describing the cardiac pacemaker control system of the crustacean Squilla is analyzed. Numerical values of the parameters of the model are chosen so as to make the solution of the equations of the model resemble the behavior of the real system. The model is used to make qualitative predictions of the system behavior when certain parameters are experimentally altered. A simplified version of the equations is used to interpret the results of the analysis geometrically.

3442. Principles in modelling biological systems - Biondi E. and Grandori F. - Cent. Syst. Theory, Inst. Electrotechn. Electron. Engin., Milan Polytechn., Milan ITA - REV.LARYNG. (Bordeaux) 1976 97/sup. (517-526)

The presented paper provides some general and introductory concepts about the description of a biological system with the aid of mathematical models. The difficulties encountered and the opportunities offered by these means are evidenced. Some examples are given to substantiate the arguments.

3443. Modelling action potentials - Elberling C. - Dept. Med. Engin. ORL, Gentofte Univ. Hosp., Hellerup DEN - REV.LARYNG. (Bordeaux) 1976 97/sup. (527-537)

The modelling of whole nerve action potentials (AP) is based on the assumption that the AP is equal to the convolution integral between the stimulus generated excitation and the activity in one primary neutrone: the unit response. The excitation function can be modelled in different ways, whereas the unit response is based on the same general philosophy maintaining some basic properties of the waveform. The convolution integral is also the basis for the deconvolution experiment, where recorded APs by means of deconvolution and non linear transformation are turned into excitation patterns in the time and the location domain. Hereby it is possible to retrieve information about the neural output from the whole cochlear partition in response to simple acoustic stimuli. It can be demonstrated that the deconvolution only in a minor degree is sensitive to differences in the waveform of the unit response. A simple model based on the tuning curves of the auditory nerve fibres acting as linear filters is set up and contains some of the basic characteristics of the auditory periphery. This is used to predict the characteristics of APs in response to low and high frequency brief sounds. The prediction is in accordance with clinical findings. In the past, a lot of speculations have been made concerning the inner and outer hair cells and their role in the AP generation. It is emphasized that models can be made on the basis of one population of receptors (neurones) only and that models based on excessive interpretation of experimental results should be avoided.

3444. Mechanism of atrioventricular conduction: Study on an analogue - Sideris D.A. and Moulopoulos S.D. - Dept. Clin. Therapeut., Univ. Athens Sch. Med., Athens GRE - J.ELECTROCARDIOL. 1977 10/1 (51-58)

A simple analogue of the heart, consisting of neon relaxation oscillators, is presented. The analogue may display several disturbances of the A V conduction, like normal atrioventricular (A V) conduction, first degree heart block, Wenckebach periods, Mobitz II type block, supernormal conduction, complete A V block, the phenomenon of accrochage in complete A V block and the absolutely arrhythmic response of the ventricles to a very high atrial rate. The analogue was constructed in the simplest possible way, i.e., using the least possible number of variables. The striking similarities between the properties of relaxation oscillators and cardiac pacemakers on the one hand and between the behavior of the analogue and manifestations of the A V conduction abnormalities based on the analogue. This mechanism is discussed in detail.

3445. Quantification of event related EEG changes: a hybrid method of sequential frequency analysis - Kamp A. NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (107-110)

A hybrid method of frequency analysis by means of which EEG changes related to behavioral events have been studied is described. Using a bank of 20 analogue filters, quantitative spectral data as a function of time were obtained. Storing, averaging and statistical analysis of the time varying spectral data was performed by means of a general purpose computer (PDP 11-20). The method was shown to be useful for the analysis of the nonstationary properties of EEG changes related to certain behavioral events.

3446. Automatic detection and localization of epileptic foci - Lopes Da Silva F.H., Van Hulten K., Lommen J.G. et al. - Dept. Clin. Neurophysiol., Univ. Hosp., Utrecht NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (116-122)

A new method of automatic EEG analysis (ASD or automatic nonstationary detection) derived from a parametric EEG model (autoregressive filter model and based on inverse filtering, has been applied to scalp and sudural EEGs of epileptic patients. By way of this method it was possible to detect the occurrence of transient nonstationarities such as paroxysmal patterns of activity (spikes, spike and waves) characteristic of inter ictal EEGs. The ASD has been implemented in a general purpose digital computer. The method allows: (a) statistical evaluation of paroxysmal patterns; (b) multichannel analysis, where the interrelationships of different derivations are quantified and displayed by means of a clinically useful spatial map. The application of the ASD method to scalp and subdural EEGs, simultaneously recorded, has revealed that a number of transient non stationarities detected in the scalp by the program yet not by visual inspection, coincide with clear paroxysmal patterns in subdural derivations. In this way conventional definitions of characteristic paroxysmal patterns at the scalp are put in question. Identical conclusions regarding the localization of an epileptogenic zone in 4 patients were obtained either using the conventional methods recording electro clinical seizures in EEGs of long uration or applying the ASD method to short EEG pochs (100 sec long at most).

447. Physical model of an electrically excitable membrane. I. Voltage current characteristics - Smolin u.N. - Res. Inst. Biol. Test. Chem. Compounds, upavna USS - BIOPHYSICS (Oxford) 1976 21/1 78-83)

The paper deals with the construction of an lementary physical model of excitable membrane tructures, and considers the nature of the N and S haped voltage current characteristics of the membrane in the absence of excitation. For curves of oth types simple analytical relations are derived in ood agreement with the known experimental indings.

448. Electrogenesis in the model of 'boundary ransfer' with the sodium pump - Ambartsumyan T.G. and Martirosov S.M. - Erevan Phys. Inst., Erevan USS - BIOPHYSICS (Oxford) 1976 21/1 (83-87)

An equation for the membrane potential is derived n a model of the sodium pump when the macromolecule carrier functions at the inner boundary of the membrane and expels sodium ions from the cell into the membrane and potassium ions from the membrane into the cell.

3449. Graph of states of the sodium channel - Yermishkin L.N. - Inst. Biol. Phys., USSR Acad. Scis, Pushchino USS - BIOPHYSICS (Oxford) 1976 21/1 (93-100)

The paper considers various models of the sodium channel of excitable membranes with 4 states one of which is conducting. It is assumed that the transition between any 2 communicating states is governed by first order kinetics. It is shown that the model may describe both the response to a single step of the potential and the link between the processes of inactivation and activation experimentally observed in the test with two depolarizing pulses if the graph of states of the channel has a point of branching between the conducting and inactivating states and the state which filled on hyperpolarization.

3450. Theory of the E.E.G. potential in a model of thin membranes of the brain. I. Model of a multilayered spherical cable - Gutman A. and Shimoliunas A. - Kaunas Med. Inst., Kaunas USS - BIOPHYSICS (Oxford) 1976 21/1 (129-134)

The problem is solved of finding e.e.g. potentials in a model where the cerebral integuments are considered as infinitely fine spheres; in low ohmic layers the potential does not change radially but in high ohmic ones the current is only radial. It turns out that the e.co.g. potentials may be described sufficiently accurately by considering the lower bone lamina an ideal insulator. The e.e.g. potentials are obtained from the e.co.g. by a comparatively simple algebraic procedure.

3451. Principles of neuronal organization. II. Informational capacity of Purkinje cell and climbing nuclear unit of the cerebellum - Dunin Barkovskii V.L. - Inst. Probl. Informat. Transm., USSR Acad. Scis, Moscow USS - BIOPHYSICS (Oxford) 1976 21/1 (134-139)

From the standpoint of the information theory the quantity of information which may be memorized by the Purkinje cell (p.c.) is evaluated, if it works in line with Marr's hypothesis. It is shown that depending on the structure of the incoming signals the p.c. may memorize either 1 or 0.7 bit on conversion to one variable synapse. In the second case covering the physiologically veritable range of signals, the p.c. memorizes only about 1/10 of the quantity of information sent for memorization. The paper also describes the scheme of a complex of the cells ('climbing nuclear unit') which makes it possible with an efficiency of 0.7 bit/synapse to memorize all the information supplied to the scheme. The scheme agrees with the known data on the character of branching of the moss and lianno fibres in the cerebellar cortex and the convergence of the p.c. in the cells of the nuclei of the cerebellum.

3452. Types of receptive fields of the lateral geniculate body and their frequency characteristics - Dudkin K.N., Bedrov Ya.A. and Gauzelman V.Ye. - Pavlov Inst., USSR Acad. Scis, Leningrad USS - BIOPHYSICS (Oxford) 1976 21/1 (154-162)

The authors have studied the time amplitude-frequency characteristic of types I and II of the receptive fields (r.f.) of the lateral geniculate body and their dependence on the contrast and spatial parameters of the light stimulus. It is shown that the frequency characteristic of the r.f. of type I depends on the contrast and area of the light stimulus; the higher the contrast for a small area of stimulus the greater the 'dip' at the low frequencies, while for a large area of stimulus the inhibition of the low frequencies is stronger for low contrast. The bandpass of the frequency characteristics of the r.f. type II does not depend on the contrast for a small area of the stimulus, for a large area there is 'dipping' at low frequencies with contrast of the stimulus. Such different behaviour of the receptive fields is illustrated by models allowing for the spatial characteristics of the r.f.

3453. Computer controlled learning in a simple system - Tosney T. and Hoyle G. - Dept. Biol., Univ. Oregon, Eugene, Ore. 97403 USA - PROC.ROY.SOC.SER.B 1977 195/1120 (365-393)

An insect preparation, in which the frequency of discharge of an identified tonic motoneurone can be modified by operant conditioning, is recommended as a model for a study of cellular neuronal events underlying learning. To facilitate the study of the underlying events, the authors have developed computer programs for on line control of training. The discharge pattern of the neurone is analysed continually, trends in mean frequency being recognized automatically. Experiments were conducted on a large number of locusts with the perfected computer programs. Statistically significant shifts are used to trigger the delivery of aversive electric shocks to the preparation. In the increase mode, shocks were correlated with spontaneous decreases in frequency. These were followed, in 68 % of preparations, by a stable increase in mean frequency (up learning) that averaged 140.0 %. In the decrease mode, shocks were correlated with spontaneous increases in frequency (down learning) that averaged 62 %. Experimentally raised or lowered frequencies were maintained for periods up to a few hours without, and longer with, reinforcement. The trends could be reversed by applying the reciprocal computer program.

3454. Motorneurons of different geometry and the size principle - Traub R.D. - IBM Thomas J. Watson Res. Cent., Yorktown Heights, N.Y. 10598 USA - BIOL.CYBERN. 1977 25/3 (163-176)

A scheme for constructing computer models of motorneurons is presented. These model neurons display both repetitive firing and action potentials of appropriate time course; the technique combines ideas of Dodge and Cooley (1973) and Kernell and Sjoholm (1972, 1973). This scheme is used to construct models of motorneurons of different input resistance (and hence different geometry) in order to examine Kernell's (1966) observations that (a) small motorneurons require a lower injected current to begin firing than do large motorneurons; but (b) the slope of the injected current firing rate curve is less for small neurons than large. It is concluded that this behavior is not a simple consequence of the cell geometry, but requires different time courses for a slow conductance across the cell membrane. This observation is consistent with the experimentally observed differences in time course of afterhyperpolarization between large and small cells (Eccles et al., 1958). The models are used to study input output relations for motorneurons when the input is a steady conductance change on the cell membrane, possibly in conjunction with an injected current. Comparisons are drawn with the experimental observations of Kernell (1965a, 1965b) and Chaplain and Schaupp (1973). It is shown that the observations of Henneman et al. (1965a, 1965b) and Milner Brown et al. (1973a, 1973b) on the order of recruitment of motorneurons under conditions of natural stimulation may be explained by the following version of the size principle: a given input to a pool of motorneurons causes equivalent conductance changes on each cell of the pool; here equivalent means the input is distributed to corresponding portions of the soma dendritic tree and is of equal magnitude in mhos. Hypotheses are offered as to how this distribution of input may be accomplished in Nature.

2.9. Nuclear biophysics

3455. Absorption, distribution and milk secretion of radionuclides by the dairy cow. V. Radiotungsten - Mullen A.L., Bretthauer E.W. and Stanley R.E. - Environm. Monitoring Support Lab. US Environm. Protect. Agency, Las Vegas, Nev. 89114 USA - HLTH PHYS. 1976 31/5 (117-424)

In a study conducted in 1969 and 1970 lactating cows were given oral or intravenous (I.V.) doses of radiotungsten. Blood, milk, urine and feces were collected and analyzed to measure transfer rate and quantity of tungsten eliminated over an extended period during and after exposure. Several lactating and nonlactating cows were sacrificed to measure tissue distribution of radiotungsten and several calves were sacrificed following oral administration of radiotungsten to determine the distribution in rapidly growing young. The average per cent of administered dose secreted per liter of milk at peak activity was 0.01 and 0.1 for the groups receiving oral and I.V. doses, respectively. During the 84 hr period after dosing, 79% of the orally administered dose was recovered, with 64% recovered in the feces, 14.6% in urine and 0.4% in milk. In the same time period, 68% of the intravenous dose was recovered with 65% in urine, 2% in the milk and less than 1% in feces. Tissue distribution results indicate the principal sites of short term radiotungsten deposition were skin, liver and soft tissue. Long term retention sites in mature cows were bone, muscle and skin. Long term retention sites in calves were bone, adrenal, skin and spleen.

3456. NMR relaxation behavior in living and ischemically damaged tissue - Barroilhet L.E. and Moran P.R. - Dept. Phys. Radiol., Univ. Wisconsin, Madison, Wis. 53706 USA - MED.PHYS. 1976 3/6 (410-414)

A study by pulsed NMR techniques in living liver tissue has led to the discovery that the observed longitudinal relaxation decay behavior is strongly multicomponent. After death of the experimental animal, the relaxation decay curves evolve toward a single component behavior. These changes can also be observed within a few minutes after the liver is excised and placed in a test tube, and they involve a high degree of quantitative and qualitative regularity and reproducibility. An excellent description of all observed NMR behavior is obtained from a dynamic two compartment model. Rapidly relaxing volumes exchange water molecules with slowly relaxing volumes; associating only an increasing water molecule exchange rate with increasing ischemia accounts in quantitative detail for all observed changes. The exchange rate values and their variation with tissue deterioration are in good agreement with that estimated for intra to extracellular water exchange as limited by cell membrane osmotic permeabilities. Possible applications of these results in different biomedical areas are discussed.

3457. Cell inactivation and DNA strand break rates after irradiation with Xrays and fast neutrons - Kampf G., Tolkendorf E., Regel K. and Abel H. - Zent. Inst. Molek. Biol., Akad. Wissensch. DDR, Berlin/Buch GDR - STUDIA BIOPHYS. (Berl.) 1977 62/1 (17-24)

Using the method of DNA centrifugation in alkaline and neutral sucrose gradients, a dependence of the rates of DNA single strand and double strand breaks on the quality of radiation was observed. Less single strand breaks are induced by fast neutrons, but more double strand breaks than after X irradiation. An oxygen nitrogen break ratio of the magnitude of about 3 is found with both single strand and double strand break rates after irradiation with X rays as with fast neutrons. A tendency of decrease of the oxygen effect at the higher LET of fast neutrons could not be observed.

3458. Response time constants of two commonly used dose rate meters - Gillespie P.J. and Alexander J.L. - Med. Phys. Dept., Belvoir Park Hosp., Belfast ENG - BRIT.J.RADIOL. 1977 50/590 (149-150)

When using this type of instrument to measure dose rates in the vicinity of a diagnostic X ray unit it is clearly desirable to lengthen the exposure time as much as possible even if the tube current has to be reduced and the resultant measured dose rate increased accordingly. Even when this is done, and on the occasions when it is not desirable to reduce the mA, the exposure times may still not be sufficiently lengthy to permit an accurate dose rate measurement without applying a correction for the time constant of the dose rate meter. It is suggested that this easily ascertained and useful information should be incorporated in manufacturers' brochures.

3459. Radiation exposure during air and ground transportation - Hsu P.C. and Weng P.S. - Hlth Phys. Sect., Nat. Tsing Hua Univ., Hsinchu TAI - HLTH PHYS. 1976 31/6 (522-524)

During a period of 1 yr, measurement of the transit exposure by thermoluminescent dosimeters (CaSO :Dy) in the Pacific, Southeast Asia and Taiwan areas showed that in air the transit exposure may amount to 10 times that on the ground with an altitude varying from 3050 to 12,200 m. The ground exposure is also included for comparison.

3460. A Monte Carlo computer model to investigate patient scheduling - Steidley K.D. and Vanloh S. - Radiat. Ther. Serv., VA Hosp., East Orange, N.J. USA - RADIOLOGY 1977 122/2 (359-364)

A Monte Carlo computer model was developed to investigate various types of patient appointment schedules for a single channel queue. Input parameters included the incidence of no shows, the rate of unscheduled walk ins, the frequency distribution of physician examination times, and the string of appointment times. The results included the frequency distributions of physician utilization rates and the total waiting time of all patients. Five hospital clinics were simulated. Even increment schedules yielded the best trade off between physician utilization and patient waiting.

3461. Utility of bottle phantom in calibration of whole body counting systems - Gupta N.K., Gupta M.M. and Bhola G.C. - Hlth Phys. Div., Inst. Nucl. Med. Allied Sci., New Delhi IND - J.NUCL.BIOL.MED. (TORINO) 1976 20/3 (132-134)

17 one litre double stoppered wide mouth polythene bottles were used to build up an adult whole body phantom somewhat similar in general characteristics to the polythene compartmentalised Bush phantom (supplied by Grey and Martin, London). A point source was kept successively in different bottles to simulate specific anatomical compartments, and the response of two types of INMAS whole body counting systems was evaluated. The responses were compared with similar responses in near identical positions from a Bush phantom and a human adult volunteer. The responses in all the three cases were very close to each other. The bottle phantom has the additional advantage of versatility, ease of handling, economy and ability to carry out detailed study on responses as a function of source position.

3462. Influence of trophic level and calcification on the uptake of plutonium observed, in situ, in marine organisms - Guary J.C. and Fraizier A. - Lab. Radioecol. Mar., Dept. Protect., Commissariat Energie Atom., Cent. La Hague, Cherbourg FRA - HLTH PHYS. 1977 32/1 (21-28)

A study has been made of the transport mechanisms of plutonium in the marine environment. This work has shown that a relationship exists between the concentration of plutonium in marine plant and animal species and the trophic level of these organisms; this relation is evidenced by a decrease in the concentration of the radioelement as the trophic level of the species increases. Three modes of transport, via water, sediment and food, have been studied. Direct contact between sea water and organisms, the principal mode of transfer to marine species belonging to lower trophic levels (the primary producers and consumers), seems to play an important role in the uptake of plutonium. On the other hand, the sediment in contact with which certain species live does not appear to constitute an important transfer vector. The trophic relations between animal species lead one to assume that plutonium is transported also via the food chain without necessarily implying that there is a concentration of the radioelement along the whole chain leading from the primary producers to the tertiary consumers. In addition, we have been able to establish that there is a relation between the rate of plutonium uptake and the calcified structures of certain marine species comparable to that which exists in the bone tissue of terrestrial mammals.

3463. A simple method to evaluate the composition of tissue equivalent phantom materials (Germ) - EIN EINFACHES VERFAHREN ZUR BESTIMMUNG DER ZUSAMMENSETZUNG VON GEWEBEAQUIVALENTEN PHANTOMMATERALIEN - Geske G. - Betatronabt., Radiol. Klin., Ber. Med., Friedrich Schiller Univ., Jena GDR - STRAHLENTHERAPIE 1977 153/2 (95-100)

A description is given of a method to calculate the composition of phantom materials with given density and radiation physical parameters of mixed components, of which their chemical composition and their effective specific volumes are known. By an example of a simple composition with three components the method is illustrated. The results of this example and some experimental details that must be considered are discussed.

3. GENERAL INSTRUMENTATION

3464. Some considerations in determining oxides of nitrogen in stack gases by chemiluminescence analyzer - Heyman G.A. and Turner G.S. - Beckman Instruments, Fullerton, Calif. USA - ISA TRANS. 1976 15/3 (209-213)

Federal regulations require the continuous monitoring of oxides of nitrogen in emissions from new fossil fuel fired Steam Generators and new Nitric Acid plants. Chemiluminescence analyzers are being widely used for this purpose. Sample handling requirements are specific for each installation. This paper discusses requirements for the total analytical system. Wet and dry basis analyses are considered, and potential interference from CO , H O, NH and SO are evaluated.

3465. Ion selective electrode analyzer for monitoring gaseous hydrogen chloride - Converse J.G., Fowler L. and Emery E.M. - Monsanto Co., St Louis, Mo. USA - ISA TRANS. 1976 15/3 (220-226)

An analyzer system was developed to monitor HCl in off gases from PVC pyrolysis and combustion in laboratory burn tests. Specific requirements to be met were as follows: Collect and present a representative sample and quantify rate and mass of HCl emission. Monitor HCl continuously with a response time adequate to follow changes in the off gas. Provide sensitivity for low emission and a wide dynamic range to meet large variability in the amount of emission. Provide direct comparison between samples for screening purposes. Be able to sample from a variety of test devices. Require minimal attention by test operator. A scrubber was developed to extract HCl from the smoke and other gases and provide a suitable sample to the ion selective electrode. A signal was generated, processed, and recorded which was linearly proportional to the amount of HCl emitted as a function of time during burning. The total amount of HCl was also determined. The lower limit of detection is less than 1 ppm. The system is able to run continuously without operator attention. Performance characteristics are given along with an example of application.

3466. A continuous electrochemical analyzer: an application for monitoring nitroglycerin in wastewaters - Shaw D.A., David D.J. and Tucker H.C. - Monsanto Res. Corp., Dayton, Ohio USA - ISA TRANS. 1976 15/3 (227-232)

A prototype, continuous, on line electrochemical analyzer has been designed, built, and tested employing pharamaceutical grade nitroglycerin (NG) tablets and actual NG wastewater samples. Preliminary laboratory test data indicate a high potential for use of the electrochemical monitor in wastewater stream applications for NG and other oxidizable or reducible contaminants. Solutions containing NG are continuously sparged with N gas to remove dissolved O., heated to constant temperature, and metered continuously through a specially designed electrochemical cell consisting of a Hg pool cathode, Pt wire anode, and miniature calomel reference electrode. A solid state, 60 Hz line frequency controlled programmer timer allows periodic, automatic correction for baseline drift (zero adjust) and standardization (span adjust) over a wide range of NG concentration. Response is linear with respect to NG concentration up to 600 ppm. Maximum sensitivity is estimated to be less than 1 ppm NG. Response varies linearly with flow rate from 5 to 35 ml/min through the cell, and response i linear with temperature over the range of 303-318 K (30-45 C). Analyzer performance using impure NG sample solutions is not degraded by small amounts o interfering substances if these are also present at th same levels in the blank and standard solutions.

3467. A miniature syringe pump for continuous administration of drugs and hormones: the Mill Hill infuser - Parsons J.A., Rothwell D. and Sharpe J.E. - Nat. Inst. Med. Res., London ENG - LANCET 1977 1/8002 (77-78)

A miniature syringe pump has been developed fo intravenous or subcutaneous infusion of the many drugs and hormones which produce better therapeuti responses when continuously delivered at a controlle rate than by repeated separate injections. The infuser uses disposable plastic syringes and is designed for precise tamper proof delivery of 2 ml/24 h or 2 ml/8 h with quartz crystal control, unaffected by high bac pressures or the resistance of extremely fine cannula This method ensures that the dose rate can be precisely determined by prescribing solutions of appropriate strength.

3468. An optical marking system for microscopic TV image analysis (Germ) - EINE OPTISCHE MARKIEREINRICHTUNG FUR DIE MIKROSKOPISCHE FERNSEHTECHNISCHE BILDANALYSE - Gahm J. - Fa. Carl Zeiss, Oberkochen GFR - MICROSC.ACTA 1977 79/1 (55-68)

An 'optical marking system' which can be coupled in reflected and transmitted light with a TV analyzer is described. With the system low contrast specimen areas or areas of complex structure are marked and made accessible for image analysis. Stereologic parameters marked in the drawing plane are measured in the TV analyzer. In TV photometry, the marked surrounding field is excluded from measurement. In addition, the system meets the requirements of a microscopic drawing equipment, a TV script projector and allows parallel transmission of comparison images.

3469. Facility and a method for evaluation of thermal protection - Stoll A.M., Munroe L.R., Chianta M.A. et al. - Crew Syst. Dept., Nav. Air Developm. Cent., Warminster, Pa. 18974 USA - AVIAT.SPACE ENVIRON.MED. 1976 47/11 (1177-1181)

The rationale, construction, operation, and protection assessment methodology of the Naval Air Development Center Fuel Fire Test Facility is scribed. The background and developmental ogress to date are discussed. It is shown that the ain difficulties associated with full scale evaluation fire protective clothing have been identified and rgely surmounted for present practical purposes. valuation can now be made reliably with a asonably small number of prototypes. lodifications in apparatus and method can be made provide for other studies. Future effort should be rected toward engineering development of scalar odels on the one hand and, on the other, basic search into the depth of burns associated with ermal exposures to radiation and to flame contact: igineering effort on scalar modelling may greatly duce the time and cost of obtaining valid burn rotection assessments, thus bringing this capability ito reach for many laboratories not now in a osition to pursue these measurements; basic iophysical research may provide a valid xperimental basis for extending prediction of burn ffects by nonbiological means to include depth of ssue injury, a feat not presently possible.

470. A heated stage and tissue culture chamber for lectrophysiology - Bonkowski L. and Runion H.I. - Jniv. Pac. Sch. Pharm., Stockton, Calif. 95211 USA - XPERIENTIA (BASEL) 1976 32/12 (1619-1622)

A simple, inexpensive heating circuit is described or use with a warmed microscope stage, small tissue ath, and heated tissue culture chamber. A major onsideration in the design of the apparatus is a ompatability with electrophysiological studies. Thus, roper shielding and low profile for microelectrode ositioning are featured.

471. A new solid state microelectrode for measuring ntracellular chloride activities - Armstrong W.M., Vojtkowski W. and Bixenman W.R. - Dept. Physiol., ndiana Univ. Sch. Med., Indianapolis, Ind. 46202 JSA - BIOCHIM.BIOPHYS.ACTA 1977 465/1 (165-170)

Solid state microelectrodes for measuring ntracellular Cl activity (αiCl) were made by sealing he tips of tapered glass capillaries (tip diameter 0.3 m), coating them under vacuum with a 0.2-0.3 μm thick layer of spectroscopic grade silver, and sealing them (except for the terminal 2-5 μm of the tip) inside tapered glass shields. 106 microelectrodes had an average slope of 55.0 ± 0.6 mV (S.E.) per decade change in αCl. Tip resistance was (77.1 ± 3.1) X 10 Ω (n = 30). Electrode response was rapid (10-20 s), was unaffected by HCO , H PO , HPO or protein, and remained essentially unchanged over a 24 h period. αiCl in frog sartorius muscle fibers and epithelial cells of bullfrog small intestine was measured in vitro. In both tissues, αiCl significantly exceeded the value corresponding to equilibrium distribution of Cl across the cell membrane.

3472. Trends in failure survival techniques for avionic systems - Price D.C. - Flight Automat. Res. Lab., Marconi Elliott Avionic Syst. Ltd, Airport Works, Rochester ENG - RADIO ELECTRON.ENGINEER 1976 46/7 (343-349)

Electronic equipment installed in aircraft has to satisfy extremely demanding requirements to achieve the requisite levels of safety and reliability, while operating in a physical environment at variance with the desirable conditions for long life of electronic components. The techniques in present use are reviewed, in particular the use of digital control systems, and likely future developments are surveyed.

3.1. Transducers

3473. Vibration patterns and radiation behaviour of loudspeaker cones - Frankort F.J.M. - Philips Res.Lab., Eindhoven NET - PHILIPS TECHN.REV. 1976 36/1 (1-15)

Many treatments of loudspeakers begin with the comment that the loudspeaker is the weakest link in the audio reproduction chain. The complex vibrational behaviour of the conical loudspeaker diaphragm, which noticeably affects the frequency response of the loudspeaker, has been a frequent challenge to mathematical analysis. Only recently however, with the availability of the computer to carry out extensive numerical computations, has it been possible to obtain any detailed picture of the behaviour of the loudspeaker cone. The picture gives a satisfactory explanation of the irregularities in the behaviour of the cone as a radiator, which had long been known from acoustic measurements. At the same time it has now become possible to indicate the dimensions and material properties that will produce the desired frequency response.

3.2. Amplifiers

3474. The influence of non linearity in active filters - Nuyen W.C. and Regtien P.P.L. - Dept. Electr. Engin., Delft Univ. Technol., Delft NET - INT.J.ELECTRON. 1976 41/3 (241-247)

The influence of amplifier non linearity on the transfer characteristic of active bandpass filters is investigated. An expression is derived for the amplitude transfer of signals at resonance frequency. Calculations are verified by experimental results.

3475. Speed limitations of feedback amplifiers due to signal delay - Weiser U., Adin A. and Arbel A. - Fac. Electr. Engin., Technion Israel Inst. Technol., Haifa ISR - INT.J.ELECTRON. 1976 41/3 (249-255)

The speed limitations of near monotonic feedback amplifiers were investigated. Theoretical considerations show that for an amplifier whose loop transmission consists of one dominant pole near the origin and the signal delay tauD only, the rise time (10 divided by 90%) is tauR = 3.3tauD for a is tauR = 2.6tauD. response; for 2% overshoot, the computed rise time is Computation for a more realistic case, in which the loop transmission includes a parasitic pole and a controlled zero, yields an optimized rise time of 1.55tauD. A discrete amplifier consisting of four 2 GHz transistors was built, and its measured response, at a total delay of 0.6 ns, was in good agreement with theory. A hybrid version of the amplifier showed no noticeable improvement over a properly laid out discrete version, in which the physical size does not add significantly to the delay due to the transistors.

3476. Phase locked loop acquisition for a noisy FM signal - Biswas B.N., Banerjee P. and Bhattacharya A.K. - Burdwan Univ., Burdwan IND - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/5 (545-550)

A method based upon the quasi linearization technique of evaluating the pull in characteristics of a phase locked loop for an angle modulated signal corrupted with Gaussian noise is presented. Experimental results along with formules for calculating the locking range and locking time are also presented and they are in good agreement with the theoretical results. Some new findings regarding the dependence of the locking range and locking time on the modulating frequency are also incorporated.

3477. Phase locked demodulator threshold: a new criterion - Biswas B.N. and Banerjee P. - Burdwan Univ., Burdwan IND - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/5 (537-544)

A new method is developed for determining the threshold carrier to noise ratio of a phase locked demodulator based on the notion of the quasi linearization technique. Simple relations showing the dependence of the threshold carrier to noise ratio on the modulation index of the frequency modulated wave are given.

3478. Phase locked loop behavior near threshold - Blanchard A. - Cent. Nat. Etudes Spatiales, Toulouse FRA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/5 (628-638)

The phase locked loop behavior is analyzed following the quasilinearization Booton's method. When the loop is locked on an unmodulated input signal with a static phase error, the phase detector nonlinearity produces an interaction between the static phase error and the voltage controlled oscillator (VCO) noise phase fluctuations. Formulas allowing one to compute the static phase error increase and the VCO phase variance increase are derived. When the input signal is phase modulated, there is an interaction between the static phase error, the VCO noise phase fluctuations, and the input signal phase modulation. Formulas are obtained that allow one to compute the loop loss of performances (static phase error increase and VCO phase variance increase) and the coherent phase demodulator output signal to noise ratio decrease. Finally, a slight modification to Booton's procedure is proposed, leading to results which agree more with experimental data.

3479. Fast response apparatus for 11 decade logarithmic current voltage measurements - Grimbergen C.A. and Kohnke G.H.P. - Techn. Phys. Lab., Groningen State Univ., Groningen NET - REV.SCI.INSTRUM. 1976 47/7 (854-858)

A measuring setup is described, which is used for the recording of the logarithmic current voltage characteristics of semiconductor devices. The logarithmic current to voltage conversion is accomplished by a transistor, connected as a diode, operating as a feedback element avoiding stability problems. The response time at low current is minimized by a compensation of the capacitance of the feedback element. The high current range is extended by a current division which is switched on automatically when the current exceeds 10 A. The importance of the quality of the insulating materials especially that of the logarithmic element, is discussed. Finally the performance of the measuring setup is demonstrated.

3.3. Indicators

3480. An equivalence between two representations fo human attention sharing - Kleinman D.L. and Cur R.E. - Dept.Electr.Engin., Univ. Connecticut, Storrs Conn. 06268 USA - IEEE TRANS.SYST.MAN CYBERN. 1976 6/9 (650-652)

It is shown that two different psychophysical representations of human attention sharing among a set of display indicators are equivalent within the framework of the optimal control model. One representation models the human as a parallel channel processor; the other treats him as a single time-shared channel. Both periodic attention allocation and ensemble average behavior of the single-channel model are discussed.

3481. Real time display of two dimensional scalar fields that vary slowly in time - Van Oosterom A. an Keuskamp B. - Lab. Med. Phys., Univ. Amsterdam NET - ELECTRON.ENGNG 1976 48/576 (41-44)

Voltages of a two dimensional array of inputs car be displayed on a standard color television set with this simple system as a matrix of rectangles. The color of each rectangle depends on the value of the corresponding input voltage. Voltage to color conversion follows a continuous scale extending fro bright blue for negative voltages, through pure gree for zero values to bright red for positive input value A resistive interpolating network allows the display both regular and irregular input grids, write the authors.

3482. Apparatus for optical characterization of displa - Barna G.G. - Materials Characterizat. Lab., Texas Instrum. Inc., Dallas, Tex. 75222 USA - REV.SCI.INSTRUM. 1976 47/10 (1258-1260)

An apparatus has been designed and constructed for the measurement of the optical characteristics of passive displays. It provides isotropic illumination t the top surface of the display and generates data on the contrast ratio of individual segments as they are viewed from any direction above the display. Typic results on the brightness, contrast ratio, and the ang dependence of this contrast ratio are shown for a commercially available LCD.

3483. Recent developments in liquid crystals and othe new display techniques - Elliott G. - GEC Marconi Electron. Ltd., Great Baddow Res. Lab., Chelmsfor ENG - RADIO ELECTRON.ENGINEER 1976 46/

81-295)

The current state of the art in liquid crystal splays and the characteristics of other newly eveloped displays, particularly electrophoretic and ectrochromic devices, are discussed. The advantages nd disadvantages of the different types of displays r particular applications are examined. The new quid cyrstal phase change, guest host system and the ectrophoretic display appear to have a wide range applications. For certain specialized devices, such the digital watch, however, where very low voltage, w power operation is essential, the twisted nematic quid crystal display appears to be uniquely suitable. he electrophoretic and solid state electrochromic stems are capable of satisfactory operation at much wer temperatures than the other types. All the stems discussed are capable of providing large area isplays with a very low power consumption and give good contrast ratio in high ambient lighting, so ight be expected to fulfil some applications not ccessible to the l.e.d. or plasma panel. The thermally ddressed liquid crystal panel appears to be a romising development for flat screen data displays arrying large numbers of digits.

3.4. Recorders

484. Gain insensitive technique for predetection utter noise cancellation in FM tape recorders - Cox D.C. - Bell Telephone Lab., Inc., Crawford Hill Lab., Holmdel, N.J. 07733 USA - REV.SCI.INSTRUM. 1976 47/7 (826-827)

A predetection technique for cancelling flutter noise in FM multichannel magnetic analog tape ecorders is described. Cancellation of all correlated flutter noise components is done automatically in the phase frequency domain so the technique is nsensitive to amplitude variations and does not lepend on any gain adjustments in the system.

3.5. Generators

3485. Quartz controlled complementary multivibrator - Tesic S. and Vasiljevic D. - Fac.Electr.Engin., Univ. Belgrade YUG - PROC.IEE 1976 123/9 (851-854)

The operation and performance of a new quartz multivibrator is presented. The multivibrator is based on a free running circuit using a complementary regenerative switch. Owing to the use of this complementary switch, the multivibrator has high regeneration, low output impedance and no integration effect. As a result, it has small transition times (40 ns) and a possibility of high loading (100Ω). Owing to the use of the quartz crystal, the multivibrator frequency is very stable at changes of supply voltage and load impedance. The circuit temperature stability is mostly dependent on that of the quartz crystal. The multivibrator can be adjusted for the generation of symmetrical or asymmetrical waveforms.

3486. Interface circuits for COS/MOS devices (Germ) - INTERFACE SCHALTUNGEN FUR COS/MOS BAUSTEINE - Blanford D. and Bishop A. GFR - ELEKTRONIK 1976 25/7 (59-62)

COS/MOS devices can be simply combined with many different kinds of electronic components. This article describes interfacing with logic families TTL, HNIL, DTL, ECL 10000, NMOS and PMOS as well as with industrial power control circuits, display units and operational amplifiers. The limitations in circuit design are also considered.

3487. Potential isolating control circuits for thyristors and triacs (Germ) - POTENTIALTRENNENDE STEUERSCHALTUNGEN FUR THYRISTOREN UND TRIACS - Knuth D. and Lukanz W. - AEG Telefunken Res.Inst., Berlin GFR - ELEKTRONIK 1976 25/7 (36-42)

The increase in the capabilities of controlled semiconductor rectifiers (thyristors and triacs) meets the current trend towards higher system voltages and powers. This article first points out the most important possibilities of information and power transmission in control systems. The main point of the article is the comparison between a control with pulse transformers and a new type which uses optoelectronic devices. It is shown that the optical control system is of particular advantage when one moves towards higher operating voltages. Description is given of control circuits for thyristor and triac applications that have already been tested and proven.

3488. Properties of low precision analog to digital converters - Collins F.A. and Sicking C.J. - Appl. Res. Lab., Univ. Texas, Austin, Tex. 78712 USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/5 (643-646)

The problem of quantization and saturation noise introduced by the process of analog to digital conversion is addressed. Analog to digital converters (ADC) with even versus odd numbers of output states are compared. Expressions are derived and evaluated which yield the signal to noise ratio and the gain versus signal level input when the input signal has an assumed Gaussian probability density. The results presented should have application in all fields in which digital signal processing is performed.

3.6. Telemetric devices

3489. A combined receptor suitable for telemetering of respiratory functions - Kuechler G., Schneiderreit R., Wolburg I. et al. - Dept. Arbeitsphysiol., Zent. Inst. Arbeitsmed., Berlin GDR - BIOTELEMETRY 1976 3/1 (19)

Results of previously reported studies about the temperature dependency of the PO_2 sensitive polarographic receptor and the compensation of the temperature effect by thermistors were used to develop the following combined receptor suitable for telemetering registration of respiratory parameters. The combined receptor consists of an impeller system called 'Wirbelrespirometer' which contains the PO_2 sensitive receptor and an additional thermistor. The impeller system measures both the inspiratory and expiratory flow, using optical signals induced by the rotation of the impeller and processed by an electronic network. The measuring range of the system is from 2.5 to 400 l/min. The breathing resistance induced by a flow of 100 l/min is in the order of 1.2 cm H O. The mass of the combined receptor is 70g. The arrangement of the PO sensitive receptor within the impeller system prevents water condensation on the surface of the Teflon membrane of the receptor.

3490. Calibration and measurement in three dimensional monitoring of human motion by optoelectronic means. II. Experimental results and discussion - Woltring H.J. - Lab. Psychol., Univ. Nijmegen NET - BIOTELEMETRY 1976 3/1 (19-20)

In this communication, some experimental results with a commercial system for real time monitoring of a number of light sources affixed to the human body are presented. Accuracy and computational speed are evaluated in terms of practical consequences like usage flexibility and hardware requirements. Some considerations on obtaining derived quantities such as velocities, accelerations, driving forces and moments are given, and the relation to current issues in statistics and control engineering is indicated.

3491. Continuous electrocardiograms on commercial pilots - Hansmann D.R., Sheppard J.J., Yeshaya A. et al. - Cardio Dynamics Lab., Inc., Los Angeles, Calif. 90064 USA - BIOTELEMETRY 1976 3/1 (20)

The effects of environmental stress on cardiac activity were examined in this study of 59 volunteer commercial airline pilots. Using a portable 2 pound cassette recorder worn on the belt, the pilot's electrocardiogram was recorded continuously for periods up to 24 h. During playback of the recorded cassette, heart rate and ECG abnormalities were detected and their frequency was used as stress indicator variables. Stress factors such as East West jet lag, long extended flights and short flights with multiple takeoffs and landings were evaluated and compared with nonflight conditions. 34% of the pilots demonstrated ectopic activity, 29% experienced ventricular ectopic activity and 61% had ST segment and T wave changes. Cardiac findings during flight and nonflight times did not differ significantly.

3492. Multichannel implantable biotelemetry: problems, pitfalls, and rewards - Reite M. and Pauley J.D. - Univ. Colorado Med. Cent., Denver, Colo. 80220 USA - BIOTELEMETRY 1976 3/1 (21)

During the last 4 years the authors have been recording seven channels of physiological data from unrestrained monkey infants living in social groups utilizing implantable biotelemetry. This paper presents a summary of their experience to date in several areas, including electrode design, management of surgical complications, and a discussion of the benefits of implantable biotelemetry in behavior related research. EKG electrodes can be incorporated in the implanted package, but EEG, EOG, and EMG electrodes must be attached at the time of implantation. Welding is preferred for attachment. Electrodes subject to tissue displacement or movement should incorporate some form of strain relief. Rigid attention to physical cleanliness and sterile technique, and irrigation of tissues surroundin implanted devices with appropriate antibiotics prior to primary closure prevent most complications. Infections often involve penicillin resistant staphylococci. Prompt vigorous surgical and pharmacological treatment will often cure secondary infections, allowing expensive experiments to continue. Primary closure of infected wounds is frequently mandatory with implanted devices. Two considerations are important in behavior related research: physiological activity is often qualitatively different in totally unrestrained animals, and when dealing with the physiological correlates of subtle social behaviors in complex animals, it is importan that external devices not be apparent, for they of an in themselves can influence the very behaviors of interest.

3493. A totally implantable multichannel telemetry system using custom integrated circuits - Knutti J.W Sander C.S. and Meindl J.D. - Integrated Circuits Lab., Stanford, Calif. 94305 USA - BIOTELEMETRY 1976 3/1 (21-22)

A miniature totally implantable system has been developed for telemetering several channels of physiological information across the intact skin of free roaming animals. Custom integrated circuits permit realization of the system's complex signal processing circuits within the small volume of an implantable package. Input signals are obtained simultaneously from four pressure transducers, a thermistor and EKG leads, with the system easily modified to accept alternate inputs. These physiological signals multiplexed with internal reference and zero signals to compensate for drift, modulate a subcarrier which is FM telemetered to a remote data station for demodulation and storage or display. The implanted package is implemented usin two custom bipolar IC chips, two commercially available C MOS chips, and a discrete FM transmitter antenna assembly. In addition, a radio controlled switch chip and battery are used to power the implanted electronics. Through micropower IC design, the system consumes less than 8 mW of power while transmitting, and has a telemetry range greater than 3 m. Simultaneous remote transmission of six physiological parameters from this small totall implanted package permits valuable long term data collection without interacting with the experimental animal. The use of custom ICs greatly reduces the number of components, achieving a small, low powe implanted package.

3494. An implantable single frequency RF powered telemetry system - Ko W.H., Hynecek J. and Kou A.H. - Case West. Reserve Univ., Cleveland, Ohio USA - BIOTELEMETRY 1976 3/1 (22)

This implantable micropower telemetry system is developed to provide long term means of monitorin body temperature, blood pressure and electrocardiogram, which are important physiologica parameters for diagnostic and research purposes. A gle coil is utilized for both signal transmission and F energy absorption so that smaller size can be hieved. This is in contrast to a conventional two il system. A time sharing multiplexing technique is ed and information is coded with pulse position odulation. The pressure transducer selected is a miconductor device made at Case Western Reserve niversity. For present purposes, the transducer is theter tip packaged. Temperature compensation of e pressure sensor is achieved externally. Successful oratory tests of the system have shown an curacy of 1 mm Hg for pressure and 0.1° C for mperature sensing. The implant unit's power nsumption is held below 1.5 mW so that enough wer delivery can be guaranteed with coil separation more than 1 in. The circuit is designed for ickfilm hybrid circuits. The high performance and gh quality signal obtained in the present data dicates that this system will provide a high tential for future longterm multichannel telemetry plications.

95. Microwave power GaAs FET amplifiers - Tserng .Q., Sokolov V., Macksey H.M. and Wisseman .R. - Texas Instruments Inc., Dallas, Tex. 75222 SA - IEEE TRANS.MICROWAVE THEORY ECH. 1976 24/12 (936-943)

The development of broad band microwave nplifiers using stae of the art GaAs power FET's vering the 6-12 GHz frequency hand is presented. unique circuit topology incorporating an edge upled transmission line section for both impedance atching and input/output dc blocking is described. he microstrip circuit design of an X band 1 W 22 B gain GaAs FET amplifier is also discussed. licrowave performance characteristics such as termodulation, AM to PM conversion and noise gure are included.

496. Digitally operating position tracking system erm) - DIGITAL ARBEITENDES POSITIONS ACHLAUFSYSTEM - Jansen D. - ist.Flugnavigat., Univ. Stuttgart GFR - LEKTRONIK 1976 25/7 (47-52)

The position tracking system described here is built p on a competely digital basis, with the result that e expensive synchro/digital and digital/synchro onverters of conventional synchro servo systems ould be dispensed with. The error sensing device in ach coordinate is an angle encoder whose 13 bit utput signal is serially compared with the set value. three point controller thereby derives the regulating ignal, which sets a stepping motor in motion by way f a drive circuit. To reduce the number of omponents, the circuitry makes considerable use of e multiplex principle. The power consumption and pace occupied are thus kept within reasonable limits.

497. Propagation along a braided coaxial cable ocated close to a tunnel wall - Hill D.A. and Wait .R. - Inst. Telecommunicat. Sci., US Dept. ommerce, Boulder, Colo. 80302 USA - IEEE RANS.MICROWAVE THEORY TECH. 1976 24/7 476-480)

A previous development is extended to permit attenuation calculations when a braided cable is located close to a tunnel wall. This is an important case in mine communications utilizing leaky feeders. Numerical results are presented to illustrate the effects of numerous parameters on mode attenuation. A principal finding is that the attenuation rate for the bifilar mode is hardly affected at all by the finite conductivity of the wall. On the other hand, the monofilar mode suffers a very high attenuation when the cable approaches the wall.

3498. Radio propagation in London at 462 MHz - French R.C. - Mullard Res. Lab., Redhill ENG - RADIO ELECTRON.ENGINEER 1976 46/7 (333-336)

Propagation measurements at 462 MHz relevant to a base station on a ten storey office block and a mobile operating at seventeen locations in London are described. Signal level as a function of range is given and a slightly altered version of Okumura's prediction is shown to agree well with the measurements. Mean signal level distributions are found to be log normally distributed with a standard deviation of 5 dB. The envelope of the received signal level is shown to have a Rayleigh distribution.

3.8. Cameras

3499. On the convergence of standard and damped least squares methods - Brusset H., Depeyre D., Petit J.P. and Haffner F. - Lab. Genie Informatique Chim., Inst. Chim., Ec. Cent. Arts et Manufactures, Chatenay Malabry FRA - J.COMPUTAT.PHYS. 1976 22/4 (534-542)

While the use of least squares minimization is quite commonly used, the Newton Raphson algorithm often fails to converge or converges very slowly for nonlinear problems. The convergence is known to become poorer with increasing nonlinearity, and an important increase in the quality of the initial estimate of the parameters is needed to reach the solution. Problems where parameters appear in highly nonlinear functions of exponential, logarithmic, or hyperbolic types are discussed.

3500. A theory of nonuniformly digitized binary pictures - Sklansky J. and Kibler D.F. - Sch.Engin., Univ. California, Irvine, Calif. 92717 USA - IEEE TRANS.SYST.MAN CYBERN. 1976 6/9 (637-647)

The authors develop a theory for the analysis of binary valued digital pictures, particularly blobs and arcs, on a fairly large class of nonuniform as well as uniform mosaics. These so called 'acute mosaics' can represent a wide variety of schemes for digitizing images in machine vision systems. These mosaics can also represent a variety of retinas in human and animal visual systems. The authors prove the existence of minimum perimeter polygon (MPP) representations of digitized blobs on arbitrary mosaics and the uniqueness of MPP's in acute mosaics. They introduce the concept of 'relative convexity,' and show its relation to the MPP. They show that the MPP reflects the concavities of th digitized blob. The authors describe and prove the validity of simple tests for cellular convexity and cellular straightness. They present and prove the validity of an algorithm for computing the MPP of so called 'normal complexes' (a broad class of digitized blobs) on an acute mosaic.

3501. Microscope cold stage for the direct observation of vacuum etching and freeze drying - Hildebrandt W.H. and Cocks F.H. - Dept. Mech. Engin. Materials Sci., Duke Univ., Durham, N.C. 27706 USA - REV.SCI.INSTRUM. 1976 47/7 (866-867)

A low temperature microscope cold stage which allows frozen specimens to be etched by either vacuum desiccation or sublimation in an inert gas has been developed. The application of this device to frozen thin films of the $NaCl-H_2O$ binary system reveals that the additional information obtained by such etching is analogous to the added information obtained from normal metallurgical specimens by etching.

4. COMPUTERS

3502. Statistical comparison of power spectra: a computer program - Fails A.M. and Verlander J.M. - Lockheed Electron. Co., Johnson Space Cent., Houston, Tex. USA - INT.J.BIOMED.COMPUT. 1977 8/1 (1-10)

A general computer program, of interest to neurobiologists, for comparison of uncorrelated power spectra is presented. The program, ALPHAF, is written in Fortran V language and is easily compiled and executed in any computer with a Fortran software package. The purpose of the program is to read power spectral density (PSD) values into a computer from digital tape and then perform the following functions: (1) compute and report power; (2) compute and report averages of the computed power values over selected frequency bands and (3) compute and report statistical standardised normal distributions for a frequency spectrum of interest. The standardised normal distribution statistic is derived by using equation 7.20, page 250 of Random data: Analysis and measurement procedures (Bendat and Piersol, 1971).

3503. A computer program system for the analysis of equispaced time series - Martin W. and Brinkmann K. - Bot. Inst., Univ. Bonn GFR - J.INTERDISC.CYCLE RES. (Amst.) 1976 7/3 (251-258)

The lack of a universal computer program for the analysis of time series in 1973 forced the authors to develop a computer program system which incorporates as many facilities as possible and enables the user to work with the data without special knowledge of program languages. The authors' interest is the detection and evaluation of periodicities in biological time series, especially of circadian rhythms.

4.1. Averagers

3504. A fast inexpensive signal averager using a television camera - Venhuizen W. and Sawatzky G.A - Dept. Phys. Chem., Univ. Groningen NET - J.PHYS.E SCIENT.INSTRUM. 1976 9/7 (551-553)

A signal averaging system for fast signals appearin with a repetition rate up to 50 Hz is described. A television camera is used as a buffer memory to put these signals into a conventional, normal speed signa averager. Circuit diagrams of the most important electronic circuits are given and discussed in some detail. The performance of this low cost system was tested experimentally and found to meet expectatio

4.2. Analog computers

3505. A new general purpose nonlinear component multivariable function generation for hybrid compute - Rubin A.I. - Electron. Associates, Inc., West Long Branch, N.J. 07764 USA - SIMULATION 1976 27 (1-12)

This paper is divided into three main sections which cover the historical significance of multivariable function generation to analog and hybrid computation, describe a new high speed Multivariable Function Generator (MVFG) for hybrid computation, and conclude with a discussio of possible application of the MVFG for general computing use.

3506. Hybrid techniques for generation of arbitrary functions - Rubin A.I. - Martin Co., Baltimore, Md. USA - SIMULATION 1976 27/1 (13-26)

A discussion of the implementation of a true hybrid function generator module is presented. Included is a detailed description of how two of the modules, when used in conjunction with a hybrid computer, are used simultaneously to generate a continuous function of two variables, and how four modules are used to generate a continuous function of three variables. From a variety of possible configurations, an optimum choice for a general purpose HFG module is made, taking into account digital coefficient storage requirements and analog multiplier requirements. A detailed error analysis compares the errors produced in generating an arbitrary function using the HFG module with the errors produced by the classical hybrid (or purely digital) method of generating an arbitrary function table look up and interpolation for discrete values the argument. The conclusion is reached that the hybrid method can be an order of magnitude more accurate than the classical discrete method for generating arbitrary functions and has further advantages in that the hybrid method does not require a 100% duty cycle in the digital processor f accurate function generation.

3507. Signal processing applications of charge coupl devices - Mavor J. - Electr. Engin. Dept., Sch. Engi, Sci., Edinburgh ENG - RADIO ELECTRON.ENGINEER 1976 46/8-9 (412-420)

The charge coupled device is essentially a sample data, analogue shift register which permits many signal processing functions to be implemented in alogue form. This paper reviews the development these devices for communication, radar and sonar plications, and summarizes the advantages of the arge coupled concept over digital techniques.

4.3. Digital computers

08. A keyboard interface for the PDP-8E computer - ale A.O. and Donley C.S. - Dept. Otolaryngol., ed. Univ. South Carolina, Charleston, S.C. 29401 SA - J.ELECTROPHYSIOL.TECH. 1976 5/2 (17-)

Circuitry was designed and constructed to interface surplus, inexpensive keyboard to the PDP 8E mputer. Such a device provides an inexpensive adily portable, noise free interface for input to the mputer.

09. An ADPCM realization of nonrecursive digital ters - Goldstein L.H. and Liu B. - ept.Electr.Engin., Princeton Univ., Princeton, N.J. 540 USA - IEEE TRANS.ACOUST.SPEECH GN.PROC. 1976 24/4 (312-320)

A realization of nonrecursive digital filters using laptive differential pulse code modulation DPCM) as the analog to digital conversion scheme presented. Output samples are computed by a quence of read only memory (ROM) lookups, ifts, and additions, thereby eliminating multipliers om the filter structure. Such ADPCM filters can pically operate three times faster than comparable CM filters realized using high speed hardware ultipliers, with power consumption reduced by 25 ercent. Equations are derived for computation time er output sample, signal to noise ratio, and efficient accuracy necessary to achieve the optimum redicted performance. Computer simulation results gree well with theoretical predictions.

510. Automatic optimum seeking program for digital mulation - Smith D.E. - Desmatics, Inc., State ollege, Pa. 16801 USA - SIMULATION 1976 27/1 27-31)

A modular computer program has been developed assist in the task of seeking optimum solutions to roblems being simulated on a digital computer. This NS FORTRAN IV program may be interfaced with ny FORTRAN simulation to monitor use of the tatistical techniques of Response Surface ethodology (RSM). The automated RSM program, hich may be used for constrained or unconstrained ptimum seeking in conjunction with deterministic or onte Carlo simulations, is now available to otential users. This paper outlines the theoretical asis of the program, describes its main omputational aspects, and discusses its application.

511. A modular approach to the hardware nplementation of digital filters - Bin Nun M.A. and Voodward M.E. - Dept. Electron. Electr. Engin., Jniv. Technol., Loughborough ENG - RADIO ELECTRON.ENGINEER 1976 46/8-9 (393-400)

Recent advances in the technology of medium and arge scale integrated circuits (m.s.i. and l.s.i.) have made possible economical hardware implementations for real time digital filtering. A flexible design approach for such implementations is presented. The processing mode can be varied to give any hybrid structure between the purely serial and parallel realizations. This leads to a design approach which can be adjusted to suit hardware availability. The resulting structures are modular and are in line with current trends in m.s.i. and l.s.i. technology in that they lend themselves readily to implementations using semiconductor read only or random access memories.

3512. Continuous speech recognition by statistical methods - Jelinek F. - Speech Processing Group, Computer Sci. Dept., IBM Thomas J. Watson Res. Cent., Yorktown Heights, N.Y. 10598 USA - PROC.IEEE (N.Y.) 1976 64/4 (532-556)

Statistical methods useful in automatic recognition of continuous speech are described. They concern modeling of a speaker and of an acoustic processor, extraction of the models' statistical parameters, and hypothesis search procedures and likelihood computations of linguistic decoding. Experimental results are presented that indicate the power of the methods.

3513. Designing in microprocessors into linear control loops - McDonnell D. - Memory Devices, East Molesey ENG - ELECTRON.ENGNG 1976 48/576 (47-51)

The low cost and small size of microprocessors now coming on to the market calls for fresh thinking in control applications. The author believes these may be used effectively as components in control loops in place of analogue devices. To this end a revision of the transform theory as applicable to microprocessors in linear control loops is included.

3514. Interface for a hand calculator and a digital power supply - Hummer C.R. and Burns D.J. - Behlen Lab. Phys., Univ. Nebraska, Lincoln, Nebr. 68588 USA - REV.SCI.INSTRUM. 1976 47/8 (921-923)

An interface using a simple calculator is described. The calculator display is encoded in BCD and drives the input of a programmable power supply, thus providing a versatile control. This gives the capability of producing a variable step ramp controlled by external clock pulses.

5. SPECIFIC MEASUREMENTS

3515. Automatic purity analysis by freezing point measurement - Grillo P.H. - TOTCO, Glendale, Calif. USA - ISA TRANS. 1976 15/3 (214-219)

The determination of purity by monitoring depression of freezing point is an established laboratory method used in the manufacture and sale of reagent chemicals. The laboratory method most commonly used is according to ASTM D 1015 standard practice. However, this method is very time consuming and costly. It is impractical for on stream control of chemical production due to lag time between grabbing sample, analysis, and process correction. A new continuous process analyzer capable of providing 12-18 min cycle time and compatible with computers, recorders, data loggers, and controllers is described. Operating Principle. An automated sampling system with a cell traps a liquid sample of the process. The sample is cooled at a controlled rate to a supercooled condition. Freezing is initiated by electromechanically knocking the cell. The cooling curve is monitored and data of each analysis cycle are obtained. Typical Applications, p Xylene, styrene, phenol, p dichlorobenzene, acetic acid, benzene etc.

3516. Surface tension balance - Clarke A.L. - Nat. Measurem. Lab., CSIRO, Univ. Grounds, Chippendale AUS - J.PHYS.E SCIENT.INSTRUM. 1976 9/7 (592-594)

A self contained instrument for the measurement of surface tension is described. A ground glass rod is used to pull up a meniscus from a liquid and the adhesion tension is measured. The readout is given directly in mN m^{-1} (or dyn cm^{-1}) with an accuracy of measurement of ±0.1 mN m .

3517. Electronic ohmmeter. An electronic device for the determination of the root canal length - Suchde R.V. and Talim S.T. - Governm. Dent. Coll. Hosp., Ahmedabad IND - ORAL SURG. 1977 43/1 (141-150)

The electronic ohmmeter was devised for the accurate determination of root canal length. Correct length can be found if precautions are taken; inaccuracy results from the presence of a lesion in periapical tissue, a wide root apex, and exudates in the root canal. The electronic ohmmeter is a useful and economical device.

3518. Developments in ion selective electrodes - Simpson R.J. ENG - LAB.EQUIPM.DIG. 1976 46/8 (23-24)

There has been a rapid expansion of the types of ion selective available from manufacturers in recent years. The author discusses this development and use of ISE's.

3519. Analysis with gas sensing electrodes - Lichtenstein S. ENG - LAB.EQUIPM.DIG. 1976 46/8 (27,29,31)

Gas sensing electrodes are in use in a wide variety of applications ranging from pollution abatement to quality control. In this article the author describes their development.

5.1. Temperature measurement

3520. Versatile, space saving Dewars utilizing a simple valve seal - Foner S. and McNiff E.J. Jr. - Francis Bitter Nat. Magnet Lab., MIT, Cambridge, Mass. 02139 USA - REV.SCI.INSTRUM. 1976 47/10 (1304-1306)

Dewars with a minimal vacuum space utilizing a simple valve arrangement and permitting a minimum loss of working volume are discussed. Dewars with a difference between the inner and outer diameter as small as 1.5 mm have been constructed.

3521. Simple method for determining molar flow rat in dilution refrigerators - Fagaly R.L. and Bohn R.C - Dept. Phys. Astronomy, Univ. Toledo, Ohio 4360 USA - REV.SCI.INSTRUM. 1976 47/10 (1307-130

A single thermocouple pressure gauge has been successfully used to measure molar flow rates in a dilution refrigerator. It is shown that over an appreciable pressure range the measured flow rates for not only helium but nitrogen can be predicted within 10% by knowing the pressure, the speed of vacuum pump, and using the equation of state for ideal gas.

5.4. Pressure measurement

3522. Pirani manometer with linearized response - Hidber H.R. and Suss G. - Inst. Phys., Univ. Base SWI - REV.SCI.INSTRUM. 1976 47/8 (912-914)

A fast reading Pirani manometer with an electronically linearized response for gas pressures between 3x10^{1} and 0.5 Torr is described. The tim constant of the manometer is 20 msec. Two NTC resistors are used, one for sensor in the vacuum system and one for the reference at constant pres The pressure in the vacuum system is measured by analog computation of the power needed to stabil the two resistors to equal temperature. By a relativ simple compensation circuit changes in room temperature within ±10 C can be eliminated to les than 1 per mille per degree. The manometer is buil from inexpensive standard electronic components.

5.11. Electrical phenomena

3523. Automatic offset of D.C. membrane potential Belgum J. - Dept. Psychol., Univ. Washington, Seattle, Wash. 98195 USA - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 19 42/2 (275-276)

A circuit is described for automatically compensating for and measuring the resting potent of neuronal membranes.

3524. Collagen fibers electrode for recording the peripheral nerve activity (Japanese) (Japa) - Yonezawa Y. and Ninomiya I. - Dept. Engin., Hiroshima Inst. Technol., Itsukaichi, Hiroshima J - JAP.J.MED.ELECTRON.BIOL.ENG. 1976 14/5 (387-392)

An implantable electrode assembly consisting of collagen and metal electrodes has been developed fill the need for the continuous recording of neural signals from the intact nerve and other bioelectric signals (EKG and EMG) in both anesthetized and awake animals. The electrical properties of collage electrodes were compared with those of convention metal electrodes in physiological saline (0.9% NaC solution. When the electrodes were implanted in th nerves of cats, the collagen electrodes filled with extracellular fluid operated as recording electrodes neural signals. The mechanical noises in the collag electrodes due to movement of the body or placement of the electrodes were negligibly small compared to those in the metal electrodes. Using is implantable collagen electrode the neural signals re recorded in awake cats 0 to 8 days after plantation surgery.

25. 'Self correcting' spherical bioelectrode - Adam Aizinbud E. and Schindler H. - Bioengin. Div., h. Engin., Univ. Tel Aviv ISR - T.I.T.J.LIFE SCI. 76 6/1-2 (45-48)

Most of the widely used biopotential macroscopic d microscopic bioelectrodes do not enable proper asurements while in contact with 'problematic' sues such as myocardial and other muscular tissues, rtical and intracavital tissues. A quantitative herical electrode was designed as an example in the nily of bioelectrodes enabling application in oving or vibrating media. The electrode developed insensitive to its contact area. Decreasing the ntact area to 40% causes 25% increase in measured sistance only. The electrode shows excellent rformance in alternating current conditions mbined with well defined direct current aracteristics.

5.12. Gas concentration measurement

26. Continuous monitoring of in vivo oxygen tension th a fuel cell - Liebman P.R., Patten M.T., Dennis .C. et al. - Dept. Surg., Boston Univ. Med. Cent., oston, Mass. USA - SURG.FORUM 1976 Vol.27 8-59)

A stable implantable oxygen sensor has been eveloped for continuous measurement of oxygen sion in blood, airway, and tissues. It consists of a ucose fuel cell in which the electron flow is roportional to the oxygen tension of the surrounding edium. The ease of calibration and stability of the el cell sensor is in marked contrast to standard lark polarographic electrodes.

527. An in vivo mass spectrometer system for the ontinuous monitoring of pO_2 and pCO_2 - Matalon .V., Ewald R.G., Hunt C.E. and Leonard A.S. - ept. Physiol., Univ. Minnesota Hosp., Minneapolis, inn. 55455 USA - J.PEDIAT.SURG. 1976 11/6 87-991)

A mass spectrometer blood gas catheter system for e continuous in vivo analysis of $P(o_2)$ and $P(co_2)$ has een presented. This system has been experimentally valuated and demonstrated to be reliable and eproducible over a period of 30 hr following sertion of the catheter in the abdominal aorta. lthough the present catheter design does not allow sertion through an existing umbilical arterial line in eonates, a clinical evaluation will be undertaken hen a more flexible catheter becomes available.

528. Transcutaneous PO_2 electrode - Vesterager P. - adiometer A.S., Copenhagen DEN - CAND.J.CLIN.LAB.INVEST. 1977 37/sup.146 (27-0)

Measurements of pO_2 on the skin surface (tc pO_2) y means of a conventional Clark electrode have under normal conditions (i.e., without producing hyperaemia) shown low tc pO_2 values and thereby indicated only a small exchange of oxygen through the skin. By using a heated Clark electrode specially designed for application on the surface of the skin, it is, however, possible to perform continous, non invasive monitoring of tc pO_2 which is highly correlated to the arterial pO_2 (pO_2 (aB)) and which responds rapidly to changes in the inspired oxygen concentration (pO_2 (I)). The tc pO_2 electrode developed by Radiometer and based on the above mentioned principles, viz.: the use of a Clark oxygen electrode, the application of hyperthermia to produce local hyperaemia is described together with the Radiometer TCM1 TC OXYGEN MONITOR. The in vitro calibration of the electrode is performed at 43°C using water saturated with atmospheric air as high calibrating standard, and a sulphite solution as zero standard. The response time of the electrode lies within the range 12-18 sec for 95% response when using a 25μ Teflon (FEP) membrane. If the calibration is performed as described, the electrode will respond almost linearly to pO_2 values up to 700 mmHg.

3529. Transcutaneous measurement of arterial blood oxygen tension with a new electrode - Friis Hansen B. - Neonatal Dept., Rigshosp., Univ. Copenhagen DEN - SCAND.J.CLIN.LAB.INVEST. 1977 37/sup.146 (31-36)

A new electrode for measuring the transcutaneous oxygen tension (tc Po_2) is described. The electrode has been tried out on newborn infants suffering from idiopathic respiratory distress syndrome (IRDS), and the results obtained have been compared with the arterial oxygen tension (PaO_2). A fairly close agreement was found, and the least deviations were seen in the range below 250 mmHg.

3530. Experiences with a new direct reading oxygen saturation photometer using ultrasound for hemolyzing the blood - Siggaard Andersen O. - Dept. Clin. Chem., Copenhagen County Hosp., Herlev DEN - SCAND.J.CLIN.LAB.INVEST. 1977 37/sup.146 (45-50)

The new oxygen saturation meter (OSM2, Radiometer A/S, Copenhagen) is fully automatic and measures the oxygen saturation and the hemoglobin concentration of whole blood or packed red cells. Volume requirement 20 μl, time 40 s. The blood is hemolyzed directly in the capillary cuvette by means of ultrasound generated piezoelectrically. The instrument measures the absorbance at wave lengths of 505 nm and 600 nm. Absorbance range 0-3. The results are calculated electronically and appear in digital display. Other applications are (1) determination of the oxygen affinity of the hemoglobin (P_{50}) after equilibrating the blood with a known pO_2 or after measuring the pO_2 in the blood sample, (2) determination of carboxyhemoglobin after complete reduction of the hemoglobin by means of dithionite, (3) determination of methemoglobin after complete oxygenation of the blood.

3531. Clinical evaluation of a new ear oximeter - Scoggin C., Nett L. and Petty T.L. - Div. Pulmon. Sci., Univ. Colorado Med. Cent., Denver, Colo. 80220 USA - HEART LUNG 1977 6/1 (121-126)

Ear oximetry offers a noninvasive method of determining and monitoring oxygen saturation in arterialized capillary blood. A new apparatus has recently been developed which provides improved accuracy as well as increased ease of use. We have found it to be at least as accurate as the American Optical oximeter which measures oxygen saturation directly from arterial blood. It has proved to be of value in clinical situations such as monitoring critically ill patients (particularly those being mechanically ventilated) and patients undergoing treadmill exercise or fiberoptic bronchoscopy and in the diagnosis of disorders characterized by periodic hypoxia.

5.14. Radiation measurement

3532. Effects of a permanent magnetic field on macromolecules - Miroshnichenko F.D. and Stadnik A.D. - State Pedag. Inst., Zaporozh USS - BIOPHYSICS (Oxford) 1976 21/1 (179-180)

Macromolecules with axial symmetry possess anisotropy of magnetic susceptibility Δ. In a permanent magnetic field there is orientation of macromolecules and their segments. The direction of orientation depends on the sign of Δ. In the case of negative values of Δ the segments of the macromolecule tend to occupy the position across the field H and for the positive Δ along the direction of H. The time of establishing the orientation for the case of a melt or solution of a polymer depends on the viscosity of the polymer system and the value of the orientation effect of H, Δ and the temperature of the polymer system. A special feature of the susceptibility kappa (K) of macromolecules devoid of an inherent electron magnetic moment is the presence of two terms, dimagnetic Kd and paramagnetic Kp: $K = Kd + Kp$, where Kd depends in the main on the 'dimensions' of the electron clouds and Kp on the character of their symmetry. Orientation of the macromolecules leads to distortion of the symmetry of the electron cloud and increase in Kp. Consequently, the total value of the susceptibility K must fall for $Kd > Kp$. The paper is concerned with the consequences of the action of a permanent magnetic field on samples of polymethylmethacrylate (PMMA).

5.14.1. Visible light

3533. A holographic attachment for the light microscope - Dodd J.G. - Dept. Phys. Astronomy, Colgate Univ., Hamilton, N.Y. 13346 USA - MICROSCOPE 1977 25/1 (55-63)

An attachment for making holograms through a light microscope is described. The attachment consists simply of a modified eyepiece which uses half of the object field as a reference wave. Together with an inexpensive laser, the attachment permits holography with any microscope equipped with a camera. Reconstructed holograms are shown and th special case of the hologram formed at the focused image plane is discussed in some detail. It is shown that in this case there is no requirement of coherenc for reconstruction and excellent reconstructions may be accomplished using diffuse white light. The cost such a reconstruction is loss of depth of field.

3534. Anomalous diffraction approximation to the low angle scattering from coated spheres. A model for biological cells - Morris V.J. and Jennings B.R. - Phys. Dept., Brunel Univ., Uxbridge ENG - BIOPHYS.J. 1977 17/1 (95-101)

The anomalous diffraction approximation has bee used in an attempt to account for the low angle scattering from composite spheres. These are used models for biological cells. Solutions have been obtained for both thinly and thickly coated sphere

3535. Measurement of Soflens(TM) posterior curvature with Moire fringes - Gilman B. - Sch. Optom. Med. Cent., Univ. Alabama, Birmingham, Ala. 32806 USA - AMER.J.OPTOM.PHYSIOL.OPT 1976 53/3 (137-144)

The posterior surface curvature of eight Bausch and Lomb Soflenses(TM) was measured by using a Moire interference fringe technique. This unique method was used to allow measurement of the curvature variation across the lens surface and to provide new information which may be helpful in understanding difficult fitting problems and improving fitting techniques. Central apical curvat values determined from lens measurements agreed with values published by Bausch and Lomb within 6%. Low negative power lenses became steeper, whereas higher minus power lenses became flatter away from the apex toward the lens periphery. However, none of the lenses tested was as flat in the outer portion of the lens as predicted by hydrodynamic forced vortex theory which should be applicable for spun cast fluid lenses. There was also significant change in curvature, first flattening, then steepening across the lens as it dried out during the course of the measurement.

3536. Photodiode and holder with 60 psec response time - Beck G. - Ber. Strahlenchem., Hahn Meitner Inst. Kernforsch. Berlin GmbH, Berlin GFR - REV.SCI.INSTRUM. 1976 47/7 (849-853)

The parameters governing the response time of a biplanar vacuum photodiode are discussed and the construction of a matched holder is described which permits operation of an ITT F 4014 diode under optimum conditions at 6 kV anode voltage. The diode holder combination is tested with fast light impulses and step function changes in light intensit The values obtained are in agreement with theory: psec for the rise time and 68 psec for the fall time with minimum signal distortion. Additional measurements cover linearity and fatigue of the photodiode.

3537. Colorimetry and instrumentation ENG - LAB.EQUIPM.DIG. 1976 46/6 (65-75)

As an analytical technique, colorimetry has been in e for over a century, during which time it has dergone a number of changes. This article provides examination of current techniques and is followed a review of some of the equipment available day.

5.14.2. Ultraviolet radiation

38. Direct response ultraviolet thermoluminescent osimeter - Dhar A., DeWerd L.A. and Stoebe T.G. - iv. Metallurgical Engin., Univ. Washington, Seattle, ash. 98195 USA - MED.PHYS. 1976 3/6 (415-417)

An integrating solid state dosimeter has been eveloped to detect ultraviolet radiation using the ocess of 'direct' ultraviolet stimulation. This process elds a thermoluminescent signal after an exposure ultraviolet radiation, without prior exposure to nizing radiation. Magnesium oxide crystals were und to show a directly stimulated ermoluminescent glow peak at 145°C which can be ilized as a linear, energy independent ultraviolet osimeter.

539. Ratio measurement of diffuse to direct solar rradiances in the middle ultraviolet - Chai A.T. and reen A.E.S. - Univ. Florida, Gainesville, Fla. 32611 SA - APPL.OPT. 1976 15/5 (1182-1187)

The experimental details in the ratio measurement f diffuse to direct solar irradiances in the middle uv re described. Some experimental data for typical artly cloudy inland summer weather in Florida are iscussed and compared with various theoretical alculations. The more extensive data for clear days om P. Bener are also compared with various alculations. The authors have concluded that it is easible to improve the uv calculations with the roposed ratio measurements for various sky onditions.

540. Photostimulated thermoluminescence of lithium uoride as an ultraviolet radiation dosimeter - uckman W.G. and Payne M.R. - Dept. Phys. stron., West. Kentucky Univ., Bowling Green, Ky. 2101 USA - HLTH PHYS. 1976 31/6 (501-504)

TLD 100 (lithium fluoride) thermoluminescence osimeters are widely employed for the detection of onizing radiations. This paper shows that these osimeters may also serve as practical germicidal ltraviolet radiation dosimeters. To measure u.v. adiation, the TLD 100 dosimeters are first exposed o 500,000 R of gamma radiation and then heated to 00°C at a temperature rate of 3°C/sec and annealed t 300°C for 1 min. Subsequent dosage of u.v. adiation may be determined by observation of hotostimulated thermoluminescence of the crystal. The presented data indicate that the hermoluminescence response is linear for exposures p to 6000 μJ/cm^2 and independent of exposure rate rom 0.1 μ W/cm^2 to above 50 μW/cm^2. Optical bsorption and sensitivity as a function of emperature of the dosimeters during u.v. exposure re presented.

5.14.3. Infrared radiation

3541. Skin thermography with liquid crystals. II. Problems of practical medical application (Germ) - THERMOGRAPHIE MIT FLUSSIGKRISTALLEN. TEIL 2: PROBLEME DER ANWENDUNG IN DER MEDIZINISCHEN PRAXIS - Herold W., Wiegel D. and Reiss C.J. - Inst. Biophys., Ber. Med. Karl Marx Univ., Leipzig GDR - Z.MED.LABORTECHN. 1976 17/6 (315-321)

A survey of the potential uses and of the special features of liquid crystal thermography in medicine is followed by the description of an equipment arrangement which allows skin temperatures to be measured objectively by means of reflection spectrophotometry, using mixtures of cholesteric substances.

5.14.4. Radiowaves

3542. Biophysics and nitroxyl radicals - Axel F.S. - Groupe Phys. Solides, Ecole Norm. Sup., Paris FRA - BIOPHYS.STRUCT.MECH. 1976 2/3 (181-218)

The present status of the spin labeling method as applied to Biophysics is examined. After an outline of the chemical and physical properties of NO radicals, the analysis of linear and non linear ESR spectra of spin labels and the information it yields is described. The possibilities of the method are critically discussed in the light of recent experiments.

3543. Power amplification of microwave FM communication signals using a phase locked voltage tuned oscillator - Hines M.E., Posner R.S. and Sweet A.A. - Microwave Associates, Inc., Burlington, Mass. 01803 USA - IEEE TRANS.MICROWAVE THEORY TECH. 1976 24/7 (393-404)

An analog phase locked oscillator is used as a power amplifier for FM communications signals. Intended service is for FDM telephone message service or television relay. The output power is generated in a varactor tuned oscillator, which is synchronized with a weak input signal using a phase lock loop. This involves a phase detector and a wide band direct coupled video amplifier whose output is applied to the tuning varactor. The paper is largely theoretical, relating the parameters of the feedback loop to the performance of the overall device. Explicit expressions are derived for the noise figure, the frequency response of the modulation characteristic, AM PM conversion, and nonlinearity effects in terms of differential gain and intermodulation. In addition, two experimental models are described, together with certain measured data. The phase lock method differs in many ways from multistage reflection amplifiers and appears to offer advantages for many applications. The device has adequate bandwidth and linearity for a single FDM FM signal with 1800 or more channels, but must be tuned to the intended frequency. Tuning procedures are simple. High gain of 25-35 dB is obtainable in a single microwave 'stage'. Most of this gain may be associated with the functions of phase detection, video amplification, and VCO tuning. Of major importance, with respect to noise, is that the device is functionally equivalent to a high gain low noise microwave preamplifier followed by a low gain power amplifier stage in which the preamplifier has the noise figure of the phase detector combined with the video amplifier, and the power stage has a noise figure appropriate to the class of power diode used. FM noise generation is substantially lower than in a high gain reflection amplifier using the same class of microwave power diode throughout.

3544. Long wavelength analysis of plane wave irradiation of an ellipsoidal model of man - Massoudi H., Durney C.H. and Johnson C.C. - Dept. Electr. Engin., Univ. Utah, Salt Lake City, Ut. 84112 USA - IEEE TRANS.MICROWAVE THEORY TECH. 1977 25/1 (41-46)

Expressions are derived for the induced electric fields in an ellipsoidal model of man, and experimental animals irradiated by an electromagnetic (EM) plane wave when the wavelength is long compared to the dimensions of the ellipsoid. Calculations of the power absorbed by an ellipsoidal model of man are given for six different orientations of the ellipsoid with respect to the incident plane wave field vectors. The results show that the induced fields and the absorbed power in the ellipsoid are strong functions of frequency, size, and orientation with respect to the incident EM field vectors. The results for the ellipsoidal model of man are also compared with those of the prolate spheroidal model.

3545. Long wavelength electromagnetic power absorption in ellipsoidal models of man and animals - Massoudi H., Durney C.H. and Johnson C.C. - Dept. Electr. Engin., Univ. Utah, Salt Lake City, Ut. 84112 USA - IEEE TRANS.MICROWAVE THEORY TECH. 1977 25/1 (47-52)

A previously developed long wavelength analysis is applied to ellipsoidal models of humans and experimental animals to obtain the distribution of tissue power absorption and average power absorption for different frequencies and orientations of the model with respect to the field vectors. Curves showing the distribution of absorbed power inside the model, and the average absorbed power versus frequency are presented for several species. Comparisons of calculated data with preliminary experimental data on monkeys are given. The theoretical results show that the power absorption in the ellipsoidal model is a strong function of frequency and orientation with respect to the incident plane wave field vectors. The quantitative data presented here are valuable for estimating tissue electromagnetic (EM) power absorption in experimental animals and humans. These data may also be used in extrapolating EM induced effects measured in animals to those expected in humans.

3546. Electromagnetic fields induced inside arbitrary cylinders of biological tissue - Wu T.K. and Tsai L.L. - Dept. Electr. Engin., Univ. Mississippi, University, Miss. 38677 USA - IEEE TRANS.MICROWAVE THEORY TECH. 1977 25/1 (61-65)

The electromagnetic field induced inside arbitrary cross sectioned cylinders of biological tissue is analyzed by integral equation and moment method techniques. A TM or TE plane wave incidence is assumed, and the cylinders consist of bone or muscl and may be multilayered. The integral equations are of the surface type, and are derived via vector Green's theorem and boundary conditions. Surface and interior fields for both a one layer and two laye circular cylinder are found to have excellent agreements with the exact eigenfunction expansion results, thus validating the numerical method. Extensive results are presented for arbitrary cross section cylinders, with among these an arm model composed of an elliptical outer muscle layer and a circular bone at the center. The field plots througho the cylinder interior thus obtained should be usefu diagnostics of microwave hazards, particularly in predictions of the so called 'hot spots'.

5.14.6. Alpha, beta and gamma radiation

3547. A novel detection circuit for Auger spectrosco - Paterson P.J.K., Denne D.R. and Leckey R.C.G. - Phys. Dept., La Trobe Univ., Bundoora AUS - J.PHYS.E.SCIENT.INSTRUM. 1976 9/4 (304-307)

An inexpensive detection system involving an active negative capacitance amplifier is described which is suitable for use with two grid retarding fie electron spectrometers. An inexpensive phase locke loop integrated circuit may be substituted for the normal lock in amplifier for all but the most critica applications leading to an unambiguous location in energy of a particular Auger line.

3548. Upper limits of α radioactivity per particle of cigarette smoke - Mogro Campero A. and Fleischer R.L. - Gen. Electric Res. Developm. Cent., Schenectady, N.Y. 12301 USA - HLTH PHYS. 197 32/1 (39-40)

The major radiation damage to lung tissue in the case of cigarette smoke is thought to originate from insoluble smoke particles with high concentrations the long lived ^{210}Pb nuclide. Therefore, the last uppe limit has special significance when compared to the reported value of 1-3x10^{-6}pCi of ^{210}Pb per tobacco trichome. The results imply that the ^{210}Pb contents c at most, a few tobacco trichomes can be incorporat into one radioactive smoke particle. Whether the radioactive smoke particles tend to cluster after deposition within the lung is a separate question th is being investigated.

3549. A gammacell safety program - Miller K.L. an Christensen R.C. - Milton S. Hershey Med. Cent., Pennsylvania State Univ., Hershey, Pa. 17033 USA HLTH PHYS. 1977 32/1 (40-44)

The use of self contained irradiation facilities (e. Gammacells) for irradiation of small laboratory samples is becoming increasingly popular. Althoug these irradiation sources are self shielded and generally considered foolproof, a formal program o use must be adopted to insure continued safe use.

e authors present a discussion of program quirements in the hope that it may provide help to ose considering licensing and installation of a self ntained irradiator.

50. Improved port film quality with six megavolt ear accelerator - Kacar N.A. - Dept. Radiat. Ther., ner. Oncol. Hosp., Philadelphia, Pa. 19111 USA - ADIOL.TECHNOL. 1977 48/4 (431-433)

This article introduces a new technique for curate verification of therapy treatment sites with diographs. It can be used not only on most linear celerators, but also on cobalt treatment units, with ght variations in exposure technique. It can minate the poor image detail presently seen and cepted at various therapy institutions with a new ethod of quality control.

51. A multidetector scintillation camera with 254 annels - Sveinsdottir E., Larsen B., Rommer P. and ssen N.A. - Univ. Copenhagen DEN - NUCL.MED. 1977 18/2 (168-174)

A computer based scintillation camera has been signed for both dynamic and static radionuclide udies. The detecting head has 254 independent dium iodide crystals, each with a photomultiplier d amplifier. In dynamic measurements multaneous events can be recorded, and 1 million tal counts per second can be accommodated with ss than 0.5% loss in any one channel. This rresponds to a calculated deadtime of 5 nsec. The ultidetector camera is being used for ^{133}Xe dynamic udies of regional cerebral blood flow in man and r ^{99}Tc(m) and ^{197}Hg static imaging of the brain.

52. Clinical significance of scintillation camera ectronics capable of high processing rates - Murphy , Arseneau R., Maxon E. and Thompson W. - aylor Coll. Med., Houston, Tex. 77030 USA - NUCL.MED. 1977 18/2 (175-179)

The use of larger scintillation detectors with high ficiency converging collimators has greatly creased the photon input rate to the crystals of intillation cameras in many clinical studies. To rocess these high count rate data accurately, odifications have been made by some anufacturers in the electronics of scintillation meras. Cameras with new electronic design were ompared with earlier models with respect to count te processing capability and the effect of high input te on spatial resolution, pulse pair pileup, image ze, and instability of the amplification of energy ulses. The improvements with the new electronic esign result in shorter imaging times, better reservation of resolution, increased statistical liability, and reduced distortion of dynamic tracer urves used for quantitative analysis.

5.14.9. Sound

553. Estimation of noise by integration of exposition me exceeding preset sound pressure levels. resentation of a new earborne sound level duration eter - Erlandsson B., Hakansson H., Ivarsson A. et al. - Dept. Otolaryngol., Malmo Gen. Hosp., Malmo SWE - SCAND.AUDIOL. 1976 5/4 (213-218)

A miniaturized earborne sound level duration time meter is described which utilizes photographic film as the storage element. It measures the time during which the sound pressure has exceeded two preset levels. In addition it records the running time of the device. The running time can be preset to either one day or one week. The microphone is placed at the entrance of the ear to measure just the sound that might damage the ear. It has been possible to make the meter so small that it can be worn under ear muffs. The weight of the complete device is 15 gram.

3554. Transducer characteristics for ultrasonic stereoholography - Feder M. and Sollish B.D. - Sch. Engin., Princeton Univ., Princeton, N.J. USA - BULL.N.Y.ACAD.MED. 1976 52/10 (1207-1223)

The characteristics of a cylindrically focused ultrasonic transducer have been presented. The steady state characteristics were validated by a computer simulation of the response parameters. The time varying putput has been examined and shown to closely approximate the steady state for relatively long observation times. These results analyze and validate design characteristics for ultrasonic transducers which will be used in further development of ultrasonic stereoholographic equipment, a marked advance in the application of ultrasound to diagnostic uses in medicine and biology.

3555. Ultrasound mammography - Baum G. - Dept. Ophthalmol., Albert Einstein Coll. Med., Bronx, N.Y. 10461 USA - RADIOLOGY 1977 122/1 (199-205)

Ultrasound mammography was performed with unique, high resolution equipment which displays changes in acoustic properties of tissues through a calibrated gray scale. Colorcoded isodensitometry was used to assist in the differential diagnosis. The rate of agreement between the ultrasound and pathological diagnoses was 86.7%. The false negative and false positive rates were 7.6% and 18.5%, respectively. Three problems must be solved before ultrasound mammography can be used as a screening device: first, additional clinical data must be accumulated. Second, the number of ultrasonograms needed for diagnosis must be reduced. Third, special equipment designed for ultrasound mammography must be developed.

3556. Optimizing the monotone performance of electrodynamic drivers using tubular couplers - Finch R.D. and Higgins P.W. - Interdisciplin. Acoustics Program, Cullen Coll. Engin., Univ. Houston, Tex. 77004 USA - J.ACOUST.SOC.AMER. 1976 60/4 (937-943)

A theory is presented for the design of resonant cylindrical couplers to be used with electrodynamic transducers to produce intense monotone signals in air. It is shown that for a given transducer there are different couplers which maximize radiation efficiency, or maximize radiated power, or which produce rho(c) loading in a connecting tube. The latter coupler loads the transducer as if it were connected to an infinitely long tube of the same diameter as the connecting tube. Several commercial transducers are examined to determine their radiation performance characteristics when loaded by suitable couplers. It is concluded that transducers are available which, when properly loaded by a cylindrical coupler, are capable of meeting the radiation requirements for devices such as an acoustic detection and ranging system. For example, a 200 W(elec.) rated commercial transducer may be made to radiate approximately 100 W(accoust.) when connected to a correctly designed quarter wavelength cylindrical coupler.

3557. A high quality ultrasonic apparatus for the ophthalmological diagnosis using manual compound scanning (Japanese) (Japa) - Kaneko A. - Dept. Ophthalmol., Nat. Cancer Cent. Hosp., Tsukiji, Chuwo ku, Tokyo JAP - ACTA SOC.OPHTHAL.JAP. 1976 80/10 (1101-1107)

A new high quality ultrasonic apparatus was develped for sophisticated diagnosis in ophthalmology. This apparatus uses a 5 MHz, 14 mm diameter, 60 mm radius of curvature focused transducer which is made of ceramics (PZT). It makes high sensitivity and high resolution possible. Manual compound scanning is done in a water bath made of a piece of surgical drape. This method of scanning brings an accurate representation of the cross section of the anatomy. The range of scanning is so wide that it is possible to scan bilateral orbits simultaneously. Ultrasonograms of both orbits are easily compared. This wide range of scanning discloses any abnormality in paranasal sinuses whose mucocele and malignant tumors frequently invade the orbits. Using a microshifting device, continuous cross sections are available. Ultrasonic information is displayed with A, B and M mode. Ultrasonic images are shown with a wide dynamic range, that is, 40 dB. Not only the shape of orbital tumors are clearly revealed but also their internal echoes with gray scale.

3558. Performance survey of ultrasound instrumentation and feasibility of routine monitoring - Christensen S.L. and Carson P.L. - Dept. Radiol., Univ. Colorado Med. Cent., Denver, Colo. USA - RADIOLOGY 1977 122/2 (449-454)

Short quality control tests for ultrasound instruments were developed based on the AIUM standard 100mm test object and procedures recommended for its use. While demonstrating the tests to technologists on their instruments, the authors obtained performance data on instruments in 22 hospitals. Subsequent quality control testing on the same instruments demonstrated that manufacturer's servicemen usually had improved performance significantly in the rather large number of cases in which adjustments were indicated by initial tests. Technologists in several hospitals, as well as the authors, performed the test routinely for extended periods of time, with a moderately high yield for detection or demonstration of malfunctions.

3559. Development of a valve for internal drainage o ascites into the venous system - Hashmonai M., Bruller S. and Schramek A. - Dept. Surg. B, Ramba Univ. Hosp., Haifa ISR - BIO-MED.ENGINEERING (Lond.) 1976 11/5 (173-179

A valve for transfer of ascites into the inferior ve caval system was developed. The valve answers the specific problems of this pathological condition, namely chemical composition and quantity of fluid and pressure gradient. The valve was used in preliminary experiments carried out on dogs.

3560. An air purification and methanator accessory f process gas chromatographs with hydrogen flame ionization detector - Villalobos R., Rowland R. and Roggenkamp R. - Beckman Instruments Inc., Fullerton, Calif. USA - ISA TRANS. 1976 15/2 (19 203)

An accessory for Process Gas Chromatographs with hydrogen flame ionization detectors (FID) permits the use of ordinary plant instrument air as source of combustion support air for the FID. Hig temperature catalytic oxidation is used to reduce hydrocarbon impurities to acceptable levels. A nick catalyst methanator is included in the heating uni which permits conversion of CO and CO_2 at low parts per million levels for detection by the FID. Both catalytic units are housed in a single explosion proof condulet suitable for use in ethylene plants an other hazardous areas. Construction details are give and operating data presented. Examples of application of the methanator to measurement of trace CO and CO_2 are shown. Typical chromatogra are included.

3561. Optimal resource allocation for an environmental surveillance system - Bar Shalom Y. and Cohen A.I. - Syst. Contr. Inc., Palo Alto, Calif 94304 USA - IEEE TRANS.SYST.MAN,CYBERN 1976 SMC 6/6 (391-400)

A model developed for optimal allocation of sampling resources in a surveillance system designe to enforce certain environmental standards is described. While the presentation is done in the specific context of a wastewater effluent pollution surveillance system, the methodology developed is potentially useful in other environmental areas. Th surveillance system considered is one applicable to finite number of sources, each containing one or more contaminants. A source can be sampled to determine whether any of its contaminants exceeds maximum allowed value. If such an excess is detected, then the source is said to be in violation. The objective is to allocate the sampling resources each source during a certain monitoring period suc as to minimize a certain performance index, subjec to a budget constraint. This performance index is taken as the expected environmental damage due t the undetected violations. The resulting optimizatio problem, which is of the integer programming typ shown to be amenable to solution via the method ximum marginal return.

2. Physical chemical appraoch to the transient nge in Na ion conductivity of excitable membranes - awlings P.K. and Neumann E. - Max Planck Inst. chem., Martinsried/Munchen GFR - OC.NAT.ACAD.SCI.USA 1976 73/12 (4492-4496)

A new method is proposed for analyzing the rapid nsient current component (Na ions) in voltage mp experiments on excitable membranes. The thod is based on only 2 very general assumptions: Na ion conductivity of an excitable membrane is ermined by some general membrane parameter, kinetic behavior of which is consistently described the sum of only 2 simple exponential terms. A st square computer analysis for the data by L. ldman and C.L. Schauf on Myxicola axons is cribed [(1973) J. Gen. Physiol. 61, 361-384]. The thod gives (as a result) the relationship between nductivity and membrane parameter. A physically usible, chemical model (cycle of 3 states) is posed for a dissipative control of the Na ion nductivity. The rate constants for the specific del are calculated from kinetic parameters derived ly from the general analysis. These rate constants roduce the original voltage clamp data in every ture which includes peak current ratios (h infinite) ft with test potential. By allowing for differences in experimental conditions, the authors derive entially the same rate constants for the voltage mp data of A.L. Hodgkin and A.F. Huxley on uid giant axons.

63. Is laminar airflow necessary for prophylaxis ainst wound infection? - Laufman H. - Inst. Surg. dies, Montefiore Hosp. Med. Cent., Bronx, N.Y. 467 USA - MED.INSTRUMENT 1976 10/6 (269- 4)

Abuse of an otherwise properly installed and intained operating room system may result in ndering the environment unsatisfactory for critical pes of surgery, especially when a patient's resistance lowered by disease or drugs, or when a large eign body is implanted. No type of special air ndling system will correct these abuses even though may reduce ambient bioparticle counts. From all ailable valid evidence, the conclusion is drawn that minar flow is less effective against wound infection an adherence to proper techniques and correction abuses of the operating room environment by the rgical team and support personnel.

64. Special air systems: The case for laminar flow - ck W.C. - Donald Guthrie Found., Sayre, Pa. USA MED.INSTRUMENT 1976 10/6 (275-276)

Laminar filtered airflow is a special air system not quired by any code for use in any operating room. is, however, a method of securing ultrasepsis when is is needed for a very particular hazardous rcumstance. Although these circumstances could be swered by other means, laminar airflow is useful in uations where a patient is particularly and usually liable to wound infection.

3565. Five years experience with operating room clean rooms and personnel isolator systems - Nelson J.P. - Orthop. Associates, P.C., Denver, Colo. 80218 USA - MED.INSTRUMENT 1976 10/6 (277-281)

Two horizontal flow, laminar airflow type clean rooms have been used for almost all clean orthopedic surgery at St. Luke's Hospital in Denver since March 1971. This experience covers approximately 4,000 cases, including 1,100 total hip and total knee arthroplasties. Three different types of helmet aspirator systems have also been evaluated. The authors' conclusions from this experience are: all types of orthopedic surgery may be easily and conveniently performed in the clean room and with scrubbed personnel wearing helmet aspirator systems; mechanical upkeep of the clean room is minimal; airborne bacteria counts have been reduced at least 80% compared to a regular operating room, and more than 90% when scrubbed personnel wear the helmet aspirator system; sterile surface contamination, including the wound has been reduced at least 80%; and the deep infection rate for total hip replacements with at least a 2 yr follow up has been 7.6% (10/131) in a regular operating room and 1.6% (5/319) in the clean room. With the combined use of the clean room, helmet aspirator systems, and perioperative antibiotics, no infections have occurred in an additional 350 cases with a 1 yr follow up.

3566. Sterility testing: How appropriate for the hospital - Whitbourne J. and West K. - Castle Co., Rochester, N.Y. USA - MED.INSTRUMENT 1976 10/6 (291-292)

In the hospital the need to test for sterility is as vital as in industry. However, the means of accomplishing this are quiet different. the sterile 'products' produced are used prior to a final sterility certification and this time honoured concept presents interesting challanges. Associated with the techniques of monitoring sterility are numerous problems. The difficulty of the hospital attempting to sterility test sterile disposable devices they have purchased and shortcomings involved in culturing techniques used to evaluate the hospital's internal sterilization program, are reviewed. A program for assurance of sterility based on proper monitoring of the sterilizer and adequate preparation of the goods being processed are given.

3567. Rodent restrainer for biomicroscopy - Pitts W.G. - Biomed. Lab., Edgewood Arsenal, Aberdeen Proving Ground, Md. USA - AMER.J.OPTOM.PHYSIOL.OPT. 1976 53/3 (154-155)

Restraint of an unanesthetized rodent for biomicroscopy and photography will prove a simple task with this easily constructed rodent restrainer.

6.1. Metabolism

3568. A device for increasing the amplitude of the pulse pressure of cerebrospinal fluid - Mancinelli R. and Pettorossi V.E. - Ist. Fisiol. Um., Univ. Cattol. S. Cuore, Rome ITA - PHYSIOL.BEHAV. 1976 17/4

(719-722)

In order to analyze the effect of increasing CSF pulse pressure a device has been designed which delivers to CSF pulsations of variable amplitude and synchronous with the CSF arterial oscillations. The R wave of the ECG triggers a circuit which provides a square wave of adjusted duration and selected delay. This wave drives a unit which controls the power supply to an electromagnetic pump.

6.2. Thermoregulation

3569. Body fluid and hematological changes in a poikilothermic animal on cold exposure: some physical changes - Biswas A. - 29, Nilmoni Sarker St., Calcutta IND - BIORHEOLOGY 1976 13/6 (385-387)

The present study is concerned with some physical changes of blood caused by cold exposure in toads (Bufo.m.). Specific viscosity of whole blood in terms of plasma viscosity was 0.563 ± 0.090 in the control group and 1.656±0.220 in the exposed group. Mean total number of corpuscles was 332.6±47.6 and 467.6±102.7 x 10'/ml in control and exposed groups respectively, i.e. the specific viscosity increases by more than 300% over the control with a 140% increase in the number of corpuscles in the exposed group. Mean lengths of major and minor axes of cells were 16.02±2.14 and 10.76 ±1.34μm in the control and 18.31±2.21 and 13.31±1.64μm in the exposed group. Mean ratio of major and minor axes were 1.59 and 1.33 in the control and exposed group respectively. This indicates that the cells of the exposed group are less ellipsoidal compared with those of the control group. It is suggested that due to cold exposure, the number of blood corpuscles increases and the shape of cells also undergoes significant change. These factors contribute towards the increase in blood viscosity.

6.3. Digestive tract

3570. The clinical significance of new instruments for endoscopy of the digestive tract - Demling L. - Dept. Med., Univ. Erlangen Nuremberg, Erlangen GFR - PROC.ROY.SOC.SER.B 1977 195/1119 (227-233)

The development of gastrointestinal endoscopes is now dictated by medical requirements. The physician is 'served' by physicists, engineers and instrument makers who are able to satisfy his clinical desires. Milestones along this path are the replacement of the rigid endoscope by Schindler in 1932, the development of fully flexible fibre optic instruments in about 1958, and the improvement of the optical quality with simultaneous reduction in the diameter of the instrument using the Hopkins Optical System since 1965. At the present state of the art, there are six main properties of the endoscope which have been improved step by step. Extension viewing: achieved by the use of optically excellent bundles of glass fibres, flexibility of the tip of the instrument, which can be moved in each of 2 planes through almost 360°, and the panning lens system which makes it possible to use the same instrument either in the forward viewing or the side viewing mode. Combination of methods: combination of inspectio and documentation. Combination of inspection and extended biopsy facility: large particle biopsy. Combination of diagnostic and therapeutic endoscopy: polypectomy, arrest of bleeding, papillotomy, extraction of gallstones. Ease of handling: rounded tips, reduced diameter, well contrived arrangement of operating controls for the mechanical and optical systems. Economy: production of robust instruments at a reasonable price. Research: measurement of pH at selected sit in the stomach; potential difference measurement a the gastric and duodenal mucosa; manometry in th region of the sphincter of Oddi; accurate placemen of tubes; extraction of pure secretion from the liver and the pancreas. New trends: introduction of laser light into the gastrointestinal tract for the purpose o arresting bleeding with graded application of power introduction of ultrasonic energy for lithotripsy.

3571. Present and future developments in endoscopy Berci G. - Dept. Surg. Endosc., Cedars Sinai Med. Cent., Los Angeles, Calif. USA - PROC.ROY.SOC.SER.B 1977 195/1119 (235-242)

The invention of the rod lens system and its clinical applications created a new chapter in endoscopy performed with rigid scopes. A few examples in miniaturization and the diagnostic valu of its implications are discussed. The impact of this new system is shown with data indicating the significant increase of examinations. The introducti of flexible fibre endoscopes opened new and more accurate diagnostic modalities in the gastro intestin tract. Results of certain procedures are analysed an the still existing problems mentioned. The extensive use of high frequency electrosurgery during procedures drew attention to certain risk factors concluding in thermal injuries; the need for safer an better electrosurgical units are emphasized and preliminary data of laser applications mentioned. Illumination sources are in a chaotic state. The nee for one universal examining stroboscopic and continuous high intensity light source, which is buil within safe parameters (u.v. and i.r.) are stressed. Some data from an experimental model of a more efficient and safe light source are discussed. The incoherent fibre light transmission is in general employed in every rigid and flexible endoscope. Th light absorption is significant (33-50 % per metre). new flexible light transmitting medium, with much better transmitting characteristics, is now available The need for a second observer (assistant) is obvio The various teaching attachments, including a new one, are compared. An objective permanent film record from any visual examination is of paramoun importance. The problems of high absorption of th image transmitting systems for cine or still photography create difficulties. The advent of new illumination sources and improved light transmittin media opened the field to the development of miniaturized 16 mm and 35 mm cameras. The vari aspects of automatic brightness and exposure contr are discussed as well as the possibilities of employi ack and white and colour television.

572. Effects of selected vocal disguises upon ectrographic speaker identification - Reich A.R., Ioll K.L. and Curtis J.F. - Speech Cent., Univ. onnecticut, Storrs, Conn. 06268 USA - ACOUST.SOC.AMER. 1976 60/4 (919-925)

This research was designed to investigate the fects of selected vocal disguises upon spectrographic eaker identification. The experiment consisted of pen trial, spectrogram matching tasks with 15 eference' and 15 'matching' speakers. The speakers roduced two sentence sets in six different ways: ormal speaking mode, old age disguise, hoarse isguise, hypernasal disguise, slow rate disguise and ee disguise of his own choosing. The reference ectrograms were always undisguised speech amples; the matching spectrograms were either isguised or undisguised. Four trained spectrographic xaminers completed the matching tasks. The results evealed that the examiners were able to match peakers with a moderate degree of accuracy (56.67%) hen there was no attempt to vocally disguise either tterance. The inclusion of disguised speech samples n the matching tasks significantly interfered with peaker identification performance. However, certain oice disguises were more effective than others. In ddition, certain speakers were considerably more ifficult to identify than others. In summary, this nvestigation did not substantiate prior claims that pectrographic speaker identification is unaffected by ttempts at disguising one's voice.

573. A continuous flow trace vapour source - Krzymien M. and Elias L. - Nat. Aeronaut. Establishm., NRC Canada, Ottawa CAN - J.PHYS.E SCIENT.INSTRUM. 1976 9/7 (584-586)

A continuous mode device for generating mixtures of air and the vapour of a high boiling point substance is described. Such a device is useful for calibration purposes in vapour trace detection work. Two streams of air, one containing the vapour and a second one diluting it, are mixed in an adjustable ratio so that low level concentrations of the vapour in an air stream can be obtained. Concentrations can be kept constant over a wide range extending to the sub PPB region. The vapour source has been used to generate the vapours of various explosives and pesticides; the results for ethylene glycol dinitrate, dinitrotoluene and fenitrothion are presented in this paper.

3574. Derivation of the equations that describe the effects of unstirred water layers on the kinetic parameters of active transport processes in the intestine - Thomson A.B.R. and Dietschy J.M. - Gastrointest. Liver Unit, Dept. Int. Med., Univ. Texas Hlth Sci. Cent., Dallas, Tex. 75235 USA - J.THEOR.BIOL. 1977 64/2 (277-294)

Unidirectional flux of solutes into the intestinal mucosal cells is determined by the rate of movement of these molecules across both an unstirred water layer and the microvillus membrane of the epithelial cell. Therefore, an equation is derived in this paper that describes the velocity of active transport as a function of the characteristics of both the transport carrier in the membrane and the resistance of the overlying unstirred water layer. Using this equation a series of curves are presented that depict the effect on the kinetics of active transport of varying the thickness (d) or surface area (S(w)) of the unstirred water layer, the free diffusion coefficient (D) of the solute, the distribution of active transport sites along the villus (f(n)), the maximal transport velocity (J(m)(d)) and the true Michaelis constant (K(m)). These theoretical curves illustrate the serious limitations inherent in interpretation of previously published data dealing with active transport processes in the intestine.

3575. The measurements of speed, acceleration and deceleration in moving subjects by means of light impulse badismography (Germ) - ZUR METHODIK DES BADISMOGRAPHISCHEN LICHTIMPULS NACHWEISES VON GESCHWINDIGKEIT, POSITIVEN UND NEGATIVEN BESCHLEUNIGUNGSGROSSEN BEI BEWEGUNGEN DES MENSCHEN - Mennet P., Ulrych I. and Harr K. - Solbadklin., Rheinfelden SWI - THER.UMSCH. 1977 34/2 (114-120)

The speed of movement, acceleration and deceleration, and kinetic energy of human extremities were accurately measured using light emitting diodes, (LED's as used in digital clocks) supplied by a high frequency generator. Impulse frequency was adjustable, the optimum range being 20-50 Hz. This technique, which is a development of classical badismography, and the use of semiconductor elements made it possible to demonstrate considerable differences in horizontal and vertical axes of acceleration, acceleration peaks (>200% higher) and kinetic energy (up to 25% lower) between patients with rheumatic or CNS disease and healthy subjects. This technique should prove useful as a means of making comparative measurements, especially in the assessment of the value of physical or drug therapy.

6.4. Liver and bile ducts

3576. Improved hemoperfusion systems for renal hepatic support - Nose Y., Malchesky P.S., Castino F. et al. - Dept. Artificial Organs, Cleveland Clin., Cleveland, Ohio USA - KIDNEY INT. 1976 10/sup.7 (244-247)

2 designs of systems for renal and hepatic support are being investigated. The charcoal capillary system described here would be effective for molecular removal of interest in renal failure due to the limitation of molecular cut off. However, if a hollow fiber membrane of larger porosity is utilized, this concept can also be applicable for hepatic failure. The plasma ultrafiltration system described is designed for hepatic failure applications in which higher mol wt transport is necessary, as in the case of protein bound solutes and transport of proteins and large molecules associated with metabolic support.

3577. The use of the Doppler ultrasonic flowmeter in the transcutaneous and intraoperative measurement of coronary artery blood flow - PROCEEDINGS OF THE SECOND EUROPEAN CONGRESS ON ULTRASONICS IN MEDICINE - Vogel S., Warnke H., Lindenau K.F. et al. - Surg. Dept., Humboldt Univ., Berlin GDR - EXCERPTA MEDICA, ICS No. 363 1975 (169-173)

To record blood flow in the coronary system, the authors used the ultrasonic Doppler method. The application of this technique depends on the clinical problem which is to be solved. It is possible: to detect the blood flow in coronary arteries; to determine the criteria of run off; and to characterize the run in pathological conditions (Benchimol et al., 1972; Loisance et al., 1971). The clinical problems define the technical suppositions. In order to solve these problems, they used a c.w. Doppler equipment at 5 MHz. It is necessary to use special ultrasonic probes to produce the Doppler signals.

3578. The nuclear stethoscope: a simple device for generation of left ventricular volume curves - Wagner H.N. Jr., Wake R., Nickoloff E. and Natarajan T.K. - Div. Nucl. Med., Johns Hopkins Med. Inst., Baltimore, Md. 21205 USA - AMER.J.CARDIOL. 1976 38/6 (747-750)

Initial evaluation has begun of a system for displaying left ventricular time activity curves, relating the intraventricular content of radioactivity with the cardiac cycle as determined by the patient's electrocardiogram. Major problems include proper positioning of the detector, correction for background radioactivity outside the ventricle and calibration of the device to permit conversion of measurement of radioactivity to measurement of ventricular volumes.

3579. Totally implantable diaphragm pacemaker: Experimental studies - Satoh I., Kaneyuki T., Fujii Y. et al. - Dept. Surg., Yale Univ. Sch. Med., New Haven, Conn. USA - SURG.FORUM 1976 Vol. 27 (290-293)

Integral to the development of diaphragm pacing as a treatment for chronic ventilatory insufficiency are the effects on diaphragm function of the stimulating waveform, electrode design, current level, and duration of stimulation. Short and long term experiments have been carried out.

3580. A servocontrolled atrial aortic assist device: experimental findings and clinical experience - Laks H., Marco J.D., Farmer T.L. et al. - Dept. Surg., St Louis Univ. Sch. Med., St Louis, Mo. 63104 USA - ANN.THORAC.SURG. 1976 22/6 (546-556)

A servocontrol system was developed to regulate a single roller pump left atrial aortic (La A) assist device. Responsiveness of the servomechanism to blood volume changes, myocardial damage, and mitral regurgitation was evaluated in 5 sheep and 6 dogs. Myocardial damage was induced by occlusion of coronary arteries, and the hemodynamic effects of La A assistance were evaluated. While La A assistance reduced left atrial pressures to low levels, the left ventricular end diastolic pressure remained elevated in the severely damaged heart. La A assistance was used in 3 patients. Two were weaned from cardiopulmonary bypass after failure of intraaortic balloon counterpulsation, and 1 is a long term survivor. The third was supported for 48 hours after attempted repair of complex congenital heart disease. The servocontrol device added to the safety of prolonged La A assistance. This mode of assistance should be considered when intraaortic balloon counterpulsation has failed.

3581. Magnetic measurements of pulmonary contamination - Kalliomaki P.L., Karp P.J., Katila et al. - Inst. Occup. Hlth, Helsinki FIN - SCAND.J.WK.ENVIRON.HLTH 1976 2/4 (232-2

The magnetic determination of pulmonary contamination is based on the remanent magnetization of ferromagnetic contaminating particles. The remanent field of the externally magnetized particles is proportional to their amount and shows their distribution. Although only magnetizable particles are detected with this method the amount of the inhaled ferromagnetic substance can be used when the total dust exposure of the worker is estimated. In this work five shipyard welders were studied. First the particles disposed to the lungs were externally magnetized and then their distribution was mapped with a sensitive magnetometer. The magnitudes of the remanent field measured from the welders differed from the fields measured from controls by several orders of magnitude. The radiographic findings showed a good correlation with the magnetic measurements, and further experiments will prove whether this method can partly replace presently used radiological investigations.

3582. Ultrasonic detection of cardiovascular flow disturbances - Winter D.C., Wells M.K. and Morgan R.J. - Colorado State Univ., Fort Collins, Colo. USA - ISA TRANS. 1976 15/3 (237-241)

Blood flow that is disturbed or turbulent may hav a significant effect on the development of cardiovascular disease. A method is presented here for detecting periods of disturbed flow using autocorrelograms of the audio signal from a pulsed ultrasound Doppler velocity meter (PUDVM). Autocorrelograms describe quantitatively how the form of a signal changes over time. The authors produced steady laminar and turbulent pipe flow in hydraulic test tank, and computed autocorrelograms of the audio signal of the centerline velocity as detected by the PUDVM using fast Fourier transfor techniques. The authors have shown that the autocorrelation coefficient averaged over a short length of time (64 ms) is significantly higher for laminar than for turbulent flow. They have also produced pulsatile flow in their hydraulic tank and computed the mean autocorrelation coefficient at different phases of the flow cycle. The regions of disturbed and undisturbed flow were predicted from the steady flow results. The disturbed flow first pears during the period of the highest forward locities. These results indicate that the mean utocorrelation coefficient can serve as an indicator f the presence of flow disturbances.

583. **Routine pacemaker control, and selective placement of pulse generators. A cost/benefit nalysis** - Grendahl H. - Dept. VIII, Ulleval Hosp., slo NOR - ACTA MED.SCAND. 1976 00/SUP.596 (61-66)

250 Patients with permanent pacemaker have been ollowed up with routine pacemaker controls in a acemaker clinic for a 21 mth period 1.3.1973 to 1.1975. 95 Pulsegenerators were replaced. 62 of the eplacements were due to impending battery xhaustion, 9 elective and 24 for other reasons. Signs iscovered by the patients led to replacements in 21 ases for impending battery exhaustion and in 17 ases for other reasons. 41 Replacements for npending battery exhaustion and 7 other eplacements followed a scheduled visit to the acemeker clinic. The selective replacement policy esulted in an average gain of pulsegenerator lifetime f 6.5 mth compared to a 24 mth elective replacement olicy. Increased safety is obtained by routine control f pacemaker patients in a pacemaker clinic.

584. **The value of an oscilloscope in routine checking f pacemakers** - Edhag O., Fagrell B. and Sjogren A. Med. Dept., Serafimerlas., Stockholm SWE - ACTA MED.SCAND. 1976 200/SUP.596 (67-71)

An evaluation has been made of the usefulness of he oscilloscope at routine check ups of cardiac acemakers. Measurements of 100 consecutive mplanted pacemakers, obtained after their removal ave been compared with changes in rate and hanges in impulse duration and amplitude obtained t previous routine controls. Other changes in acemaker characteristics have also been evaluated. Eight faulty pacemakers were found. Six had a decreased voltage, none however, less than 3.5 volts. Five of them had shown a decrease in rate by at least 7 impulses per minute, while in one QRS synchronized pacemaker the synchronizing circuit did not function. In one pacemaker the stimulating rate had increased with 20 impulses while in one P synchronized pacemaker the delay time had decreased. In 6 patients a significant decrease of the mpulse amplitude was noticed without fall in voltage or electronic failure and in 3 others no decrease of the impulse duration was noticed in spite of decreased voltage at check after explantation. The present study therefore indicates that, at routine check ups of the presently analyzed pacemakers with voltage depending stimulation rate, an analysis of the latter gives satisfactory information of pacemaker function and can be used instead of oscilloscope test, eventually in combination with electronic measurements of impulse duration.

3585. **Disturbance in rhythm in 2 patients with a permanent pacemaker and 2 endocardial electrodes** - Kjersgaard Johansen J. - Dept. Clin. Physiol., Odense Univ. Hosp., Odense DEN - ACTA MED.SCAND. 1976 200/SUP.596 (80-82)

Rhythm disturbances are described in 2 patients with an implanted permanent pacemaker. Both patients had nonfunctioning electrodes retained after previous complications. It was possible to observe, in both patients, during fluoroscopic examination that the electrodes occasionally touched each other. The etiology of the rhythm disturbances are discussed on the basis of the technical specifications of the pacemakers. The interpretation of rhythm disturbances in patients with implanted pacemakers presents special problems. Disturbances in rhythm can be spontaneous and have no relation to, but possibly be modified by, the implanted pacemaker. However, the rhythm disturbances can also result from the technical specifications of the implanted pacemaker or from defects in the same. The following case histories describe disturbances in rhythm in two patients, who both had 2 endocardial electrodes of which only one was connected to the implanted pacemaker.

3586. **Pacemakers and external interference** - Elmqvist H. - Siemens Elema AB, Solna SWE - ACTA MED.SCAND. 1976 200/SUP.596 (83-86)

This paper is an attempt to identify and describe the most common sources and effects of external electromagnetic interference on cardiac pacemakers in as nontechnical terms as possible. The normal function of an inhibited pacemaker is also discussed.

3587. **Interference with cardiac pacemaker function** - Ohm O.J. - Med. Dept. A, Univ. Bergen NOR - ACTA MED.SCAND. 1976 200/SUP.596 (87-95)

A survey is given of the factors affecting cardiac pacemaker function. Whereas it was earlier considered that external interference was a frequent cause of pacemaker failure, more recent studies indicate that this is of minor importance. It would appear that failure of pacemaker function due to changes in the QRS complex, i.e. voltage change, intraventricular conduction defects and frequency changes, are more important. A lesser known cause of failure in demand function is the inhibition which arises from skeletal muscle potentials. This appears to be a major problem in some types of pacemaker. Manufacturing defects are unavoidable, and it can still be assumed that electronic component defects may develop in 1 of 1000 pulse generators. Cases with the problem of early run away pacemaker are still being reported and two such cases are discussed. In one of the patients the run away phenomenon was intermittent, and was accompanied by a variation in run away frequency. This possibility should thus always be taken into consideration in a pacemaker patient presenting with syncope. In a patient with a QRS inhibited pacemaker a double stimulation phenomenon has been observed. Various causes of pacemaker failure due to the condition of the electrode are reviewed.

3588. **Automated analysis of the left ventricular diameter time curve from echocardiographic recordings** - Decoodt P.R., Mathey D.G. and Swan H.J.C. -

Dept. Cardiol., Cedars Sinai Med. Cent., UCLA Med. Cent., Los Angeles, Calif. 90029 USA - COMPUTERS BIOMED.RES. 1976 9/6 (549-558)

In order to analyze the left ventricular diameter time curve, a computer method has been developed. It includes a cursor hand controlled digitization and optimization of calibration which is valid for a majority of digitalization devices. The advantages of well spaced multiple point calibration are improvement of accuracy, correction of record distortion, and elimination of human error. The left ventricular endocardial echoes were digitized at a sampling rate of 1 kHz by moving a hand controlled cursor across a photographic record. Adequate smoothing and derivation of the data leads to recognition of a typical diameter time curve. An automated analysis of this curve can then be performed for several successive beats. In systole, the maximal velocity of circumferential fiber shortening and the percentage of systolic shortening can be defined. During diastole, three phases can clearly be separated: rapid filling, slow filling, and atrial 'kick'. The contributions of each of these phases can therefore be quantified from the pattern analysis of the left ventricular diameter time curve.

3589. Intraesophageal microphone for phonocardiographic recording - Tonnesen A.S., Gabel J.C., Cooper J.R. et al. - Dept. Anesthesiol., Univ. Mississippi Med. Cent., Jackson, Miss. 39216 USA - ANESTHESIOLOGY 1977 46/1 (70-71)

Determination of systolic time intervals requires a simultaneous high speed recording of the electrocardiogram (ECG), phonocardiogram (PCG), and central pulse tracing (CPT). The interval from the onset of the Q wave of the ECG to the initial high frequency vibrations of the second heart sound (S_2) of the PCG (Q S_2 interval) is a basic measurement. Unfortunately, the site of the surgical procedure or extent of the sterile field, patient position, or noise in the room may prevent the use of a precordial microphone. The authors have recorded PCG's simultaneously from the precordium and from a standard esophageal stethoscope with a second external microphone. The PCG's recorded from the two sites were not consistently equivalent. An intraesophageal microphone was fabricated and recorded time intervals were found comparable to those obtained with the precordial method.

3590. Teflon vascular prosthesis and artificial prosthetic valve for right ventricular outflow reconstruction (Japanese) (Japa) - Mori A. - II Surg. Div., Shiga Med. Coll., Kyoto Univ. Med. Sch., Kyoto JAP - J.JAP.ASS.THORAC.SURG. 1976 24/10 (1333-1342)

Four patients successfully underwent reconstruction of right ventricular outflow tract, using woven Teflon vascular prosthesis and a Bjork Shiley tilting disc aortic valve prosthesis; one with tetralogy of Fallot (TF) and absent pulmonary valve, two with complete transposition of the great arteries (TGA), ventricular septal defect (VSD) and pulmonary stenosis (PS), and one with double outlet left ventricle (DOLV), VSD, patent ductus arteriosus (PDA) and PS (after pulmonary valvotomy for pulmonary atresia). In two patients with TGA, VSD and PS, external conduit reconstruction (Rastelli operation) was carried out with vascular prosthesis containing a Bjork Shiley prosthetic valve which has not been used as a right ventricular outflow tract in Japan so far. In the other two, Bjork Shiley valve wa inserted in the pulmonary valve position, and the vascular prosthesis was used as a patch for the right ventricular outflow tract reconstruction. Compared t the other materials of outflow prosthesis, Teflon vascular prosthesis can be available everywhere in any size and length. Moreover, the ability to tailor the graft to fit the anatomical situation is another distinct advantage. Uncertainty still remains about long term tissue valve durability. The authors consider that the durability of Bjork Shiley valve outweighs the risk of thromboembolism, which has been negligible for aortic valve replacement with this valve, and may be less of a problem with prosthetic valves since the lungs are less sensitive to small emboli than the systemic circulation. There has been no report in the English literature so far, which describes the successful total correction following th pulmonary valvotomy for DOLV with pulmonary atresia, VSD and PDA.

3591. Fatal outcome arising from use of a sutureless 'corkscrew' epicardial pacing electrode inserted into apex of left ventricle - Vecht R.J., Fontaine C.J. and Bradfield J.W.B. - Dept. Cardiol. Pathol., St Mary's Hosp., London ENG - BRIT.HEART J. 1976 38/12 (1359-1362)

A 59 yr old man is described in whom the insertio of the epicardial sutureless 'corkscrew' electrodes resulted in fatal ventricular perforation. Fatal myocardial perforation can occur with this electrode and the apex of the left ventricle should never be used as the site of insertion. Necropsy also showed that the transvenous right ventricular electrode, inserted one year previously, had penetrated a tricuspid leaflet. This could have accounted for the ensuing pacing failure.

3592. Transapical aortic perfusion method with a double barreled cannula experimental study and clinical application (Japanese) (Japa) - Tanaka T. - Dept. Surg., Heart Inst. Japan, Tokyo Women's Me Coll., Tokyo JAP - J.JAP.ASS.THORAC.SURG. 1976 24/9 (1218-1229)

The 'transapical aortic perfusion method' with a 'double barreled cannula', a new approach to arteria perfusion for cardiopulmonary bypass circulation, ha been developed from a 'single attachment heart bypass' method invented as a means of left heart assisted circulation in 1969, and was applied to 122 open heart surgeries in the past 3 years. The operations resulted in 16 early deaths and one late death. None of them, however, were caused by the perfusion method. No serious complications were found. All of the living patients are doing favorably well, and the survival rate is 98.8% at 3 years. The smaller double barreled cannula is planned to be d for patients with a smaller body surface area n 0.7 m', the middle size one may be used for ople with a body surface area between 0.7 and 1.3 and the larger double barreled cannula is favored those with a larger body surface area than 1.3 m'. is perfusion method can be smoothly carried out the coordinated work of the surgical operator, his istants and an instrument nurse. Placing the nnula tip precisely at the pericardial reflexion in ascending aorta and closing properly the nnulation site in the left ventricular apex are the ps requiring the utmost caution. The method is orable to all age spans from infants to adults, and ove all, the former whose tiny vessels preclude a rfusion cannula with a sufficient caliber from being plied. By taking a median sternotomy approach, rious surgical heart diseases and procedures can be vered by this method except for aortic valve placement and other procedures requiring working the aortic root. In the case of ischemic heart sease, the transapical cannulation possibly injuring coronary collaterals must be considered in mparison with those conventional arterial nnulation methods to which fatal complications are cidental. The transapical aortic perfusion method th a double barreled cannula has been developed om the left heart bypass circulation method vented by Chardack et al. in 1966 and by the thor and his co worker in 1969. The method was cognized as being safe and useful clinically.

93. Sampling rates required for digital recording of tracellular and extracellular cardiac potentials - Barr .C. and Spach M.S. - Duke Med. Cent., Durham, .C. 27710 USA - CIRCULATION 1977 55/1 (40-)

Electrocardiograms and cardiac electrograms now equently are measured for both clinical and perimental purposes by direct digital sampling, ith no recording of the signal in analog form. This udy examined the question of what sampling rates ere required to measure accurately the continuous aveforms from the digital samples. Body surface aveforms and intracellular and extracellular aveforms measured directly from cardiac tissues ere evaluated. Cardiac measurements included aveforms from the atrium, ventricle, atrioventricular ansmission system and individual Purkinje strands. ampling rates as high as 15,000 samples/sec were quired to record accurately extracellular waveforms f the ventricular conduction system. Decreasing ampling rates were required as the recording site hifted through the ventricle to the body surface, here sampling rates as high as 1500 samples/sec ere necessary.

594. Prototype development of the cardiac ynchronized augumented pulsation pressure concept - hillips C.A. and Rogers D.B. USA - IEEE RANS.AEROSPACE ELECTRON.SYST. 1976 2/3 (417)

This paper describes the design and development f a cardiac synchronized augumented pulsation ressure concept. The prototype system is defined in terms of its three individual components: a specially modified U.S. Air Force CSU 3/P G suit, a servo valve controlled pressure manifold, and the ECG synchronizing circuitry. The prototype system has been tested in the laboratory (one human subject) and in the environmental simulator (one human subject). The data from these tests and the reactions of the subjects are presented. Engineering and physiological conclusions are drawn based upon the acquired data. Specific recommendations for future development of the augmented pulsation pressure concept are presented.

3595. An isothermal flowmeter with improved frequency response for measuring tissue blood flow - Von Olshausen K., Gross R. and Kirchheim H. - I Physiol. Inst., Univ. Heidelberg GFR - PFLUG.ARCH.EUR.J.PHYSIOL. 1976 367/1 (97-102)

An isothermal flowmeter with improved frequency response for measuring tissue blood flow was developed using thermistors. Direct heating of the thermistors allows a simple construction of small (0.5 mm outer diameter) capillary probes which do not require any additional heating coil. The changes of a feedback current necessary to keep the thermistor at a constant increment above tissue temperature indicate tissue blood flow; a second thermistor compensates variations of tissue temperature. The dynamic performance of the device shows a low pass characteristic with a cut off frequency higher than 5 Hz. Fow low flow rates the output signal was found to be proportional to the flow; for higher flow rates a linearization was necessary. Since tissue temperature can be recorded continuously, intermittent quantitative in vivo calibration seems possible by evaluation of 'heater off' curves in the perfused and non perfused tissue. As the flowmeter is insensitive to tissue temperature, it can be used for long term recordings.

3596. Adaptation of the artificial heart lung machine to cardiac surgery in infants and young children (Fren) - ADAPTATION DU COEUR POUMON ARTIFICIEL A LA CHIRURGIE CARDIAQUE DU NOURRISSON ET DE L'ENFANT - Vives M., Barthelemy R., Puel P. and Enjalbert A. - Dept. Chir. Cardio Vasc.; CHU Rangueil, Toulouse FRA - ANN.CHIR. 1976 30/9 (283-285)

The authors describe some modifications to the heart lung machine. These modifications were aimed at reducing to a minimum the volume of fluid required for priming. After describing the equipment, the authors explain the technique of extracorporeal circulation. They emphasize the importance of maintaining the biochemical composition constant in the priming fluid and during the course extracorporeal circulation. This special modification, after being tested in animals, is now being used in cardiac surgery in infants and young children.

3597. Directional non uniformity of pulsatile intramyocardial pressure - Koyama T., Yagi T., Sasajima T. and Kakiuchi Y. - Div. Physiol., Res.

Inst. Appl. Electric., Hokkaido Univ., Sapporo JAP - EXPERIENTIA (BASEL) 1976 32/12 (1617-1619)

A method using piezoelectric ceramics was newly devised which measures intramyocardial pressure. In open chest dogs, a directional non uniformity of the intramyocardial pressure was observed, which may be attributable to the variation in the myocardial fibre orientation.

3598. A simple model for the crustacean cardiac pacemaker control system - Plant R.E. - Dept. Mathemat., Univ. California, Davis, Calif. 95616 USA - MATH.BIOSC. 1976 32/3-4 (275-290)

The crustacean cardiac pacemaker is a particularly useful experimental preparation for the investigation of neural control of rhythmic phenomena. In this paper a review of the experimental literature concerned with the pacemaker system of the mantis shrimp Squilla is given. It is pointed out that the anatomy and physiology of this animal are such that a very simple model may serve to describe the significant characteristics of its cardiac pacemaker control system. Such a model, relating muscle tension and length to pacemaker membrane potential, is derived. The applicability and use of the model are discussed.

3599. Interaction of oscillators: Effect of sinusoidal stretching of the sinoatrial node on nodal rhythm - Ushiyama J. and Brooks C.McC. - Dept. Physiol., Downstate Med. Cent., State Univ. New York, Brooklyn N.Y. 11203 USA - J.ELECTROCARDIOL. 1977 10/1 (39-44)

In this study of factors affecting and integrating activity of cardiac tissues, isolated strips of rabbit atria containing the sinoatrial node were subject to sinusoidal stretch. Effects on electrical discharge rates and rhythm of this pacemaker were observed. Repetitive stretch of a few millimeters (20-40% increase in length) caused acceleration and produced oscillations in rate which were roughly proportional to frequency of stretching. At fast frequencies of stretching, the sinus rates oscillated faster but not synchronously. When rate of stretching approached the 'resting' rate of the sinus, a 'lock in' occurred, in that sinus rate accelerated but oscillations disappeared. During stretching rates approximately twice resting rate, the oscillations again disappeared. At rates of stretching during which oscillations were synchronous, the time of pacemaker firing changed to coincide with the peak phase of the applied sinusoidal stretch, although several seconds were required for this adjustment. Interval histograms also showed that application of sinusoidal stretch imposed a greater regularity on pacemaker action. It was thus demonstrated that oscillatory stretch can affect the intrinsic oscillatory processes of the cardiac pacemaker and an interaction of oscillators conceivably can occur in the heart.

3600. Intercellular electrical coupling in the sinoatrial node of rabbit's heart (Russian) (Russ) - Bukauskas F.F., Veteikis R.P., Gutman A.M. and Mutskus K.S. - Kaunas Med. Inst., Inst. Cardiol., Kaunas USS - BIOFIZIKA 1977 22/1 (108-112)

Passive electrical properties of SA node region of rabbit's heart were studied. Electrotonic anisotropism was characteristic of the entire SA node; anisotropism decreased moving from crista terminali to interatrial septum. The input resistance, R(bx), wa the largest in the region of true pacemakers and decreased moving to the perinodal region. Analysis c the results yielded specific resistance values for contacts and electrogenic membrane of 3 Ohms.cm and 10^{1} Ohms.cm respectively.

3601. Use of the spiral coil membrane oxygenator during open heart surgery in infants and children - Saxena N.C., Hillyer P. and Edmunds L.H. Jr. - Div Cardiothorac. Surg., Child. Hosp., Philadelphia, Pen USA - J.CARDIOVASC.SURG. (TORINO) 1977 18/1 (1-7)

The spiral coil membrane oxygenator was used without an arterial line filter during short term tota cardiopulmonary bypass in 50 infants and children The compact oxygenator proved to be efficient and reliable, was easy to operate in a simple perfusion circuit, has a high flow rate to priming volume ratio and eliminated gaseous emboli. During perfusion, platelet counts and fibrinogen concentrations decreased 51 and 31% respectively. Coagulation studies in eight infants less than 15 kilograms perfused with the membrane oxygenator system did not differ from those in 7 infants perfused by a bubble oxygenator system.

3602. Continuous arterial blood pressure measureme by means of an arterial catheter. Its interest in secondary transportation (Fren) - LA MESURE EN CONTINU DE LA PRESSION ARTERIELLE PA VOIE SANGLANTE SON INTERET DANS LES TRANSPORTS SECONDAIRES - Tonellot J.L., Estorc J., Gippet J. et al. - Clin. St Eloi, Montpellie FRA - ANN.ANESTH.FRANC. 1976 17/11 (1263-1268)

It is of no much use to assess the cardiovascular condition of patients with impending or confirmed shock by taking the blood pressure with the classica arm cuff, especially if artefacts such as noise, vibrations, shaking, etc. are interfering. Instant continuous measurement of blood pressure by mean of arterial cannulation avoids those drawbacks and i a sure and efficient method of assessment of an ofte unstable, precarious and sometimes aggravated cardi vascular condition by the very transportation. The S.A.M.U. of Montpellier used this technique in 15 cases. The authors report their experience and also discuss some technical problems that may occur.

3603. The time course of changes in systolic time intervals after a change in body position. (A pilot study) - Van Der Hoeven G.M.A. and De Monchy - St Josef Hosp., Eindhoven NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (56-58)

Systolic Time Intervals (STI) contain information about the quality of the heart. In an attempt to obtain more information during the measurement of

I, several investigators have used an intervention also obtain information on the adaptation of the rculation to the changed circumstances. The estion which we wanted to answer in this paper as how much time is needed by the circulation to lapt to the changes position from the supine to the ect posture. The conclusion is that adaptation of e circulation from the supine to the erect posture kes about 1 minute in healthy persons.

04. Peripheral pulse contour analysis in determining roke volume - Lasance H.A.J., Wesseling K.H. and scoop C.A. - Dept. Cardiol., Antonius Hosp., trecht NET - PROGR.REP.MED.FYS.INST.TNO 76 no.4 (59-62)

Registrations of central and peripheral intra terial blood pressures at four sites have been made 74 patients. Transfer functions from the ascending rta (AA) to the brachial, abdominal and subclavian teries were determined by use of Fourier analysis. he inverse brachial transfer function averaged for all atients was used for reconstruction of AA pressure aves from brachial waves on an individual basis. ncalibrated pulse contour stroke volume were omputed for each patient, using the central (AA), rachial and reconstructed central pressure pulse ontours and comparing them to each other. Use of e reconstructed AA wave appeared to produce a etter estimate of the pulse contour stroke volume an did use of the brachial pulse directly.

605. Haemodynamic changes in the cerebral irculation of the cat during occlusion of the middle erebral artery - Tulleken C.A.F., Van Dieren A., ollenvanger W.J. and Van Der Eijk P. - Ursula lin., Wassenaar NET - ROGR.REP.MED.FYS.INST.TNO 1976 no.4 (140-45)

In a group of 21 cats, the middle cerebral artery ressure (MCAP) was recorded by means of a atheter introduced into the artery at its origin, just istal to the occlusion. The effects of hypertension nd hypercapnia were studied. In a group of 5 cats, oth middle cerebral arteries (MCA) were atheterized and the pressure was recorded imultaneously on both sides. In another group of 5 ats, O_2 tension measurements were made with the id of oxygen electrodes in the brain tissue, the ccluded MCA and the common carotid artery. Some f the results obtained in this study are compared ith the results of a previous study where monkeys ere used as experimental animals.

3606. An analysis of the ultrasonic properties of oppler transducers used for fetal heart rate detection - Oosterbaan W.A., Van Der Weide H. and Van Eijnsbergen B. NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (187-193)

As part of an evaluation of fetal monitoring equipment, the properties of those transducers which are used in the ultrasound Doppler system of these instruments were investigated. In this article, a description of the methods used to measure the transmitting beam, the ultrasonic power and the detection area of these Doppler transducers is given. Finally, the measured results are verified by the experiences gained in the clinic for obstetrics.

3607. Reproducible quasi static pressure volume diagrams of the lungs in anaesthetized dogs - Douma J.H., Laros C.D. and Wammes L.J.A. - Pulmon. Dept., St Antonius Hosp., Utrecht NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (203-210)

A description is given of a respirator- and measuring set up allowing reproducible quasi static pressure and volume measurements on the lungs of a dog under controlled conditions. The measurements can be carried out over the entire volume range with constant inspiratory and expiratory flow. The set up is developed to study influences of biologically active substances on the viscoelastic properties and behavior of the lungs. The volume pressure loops have been shown to be reproducible both during one session and over a period of several weeks, in the same dog.

3608. Design and haemodynamic evaluation of the ellipsoid heart for total heart replacement (Germ) - KONSTRUKTION UND TIEREXPERIMENTELLE BEFUNDE MIT EINER NEUEN FORM EINES KUNSTLICHEN HERZENS: DAS ELLIPSOIDHERZ - Unger F. - II Chir. Univ. Klin., Wien AUA - WIEN.KLIN.WSCHR. ARZT 1977 89/Sup.65 (17p)

Thromboembolism is a complication which represents a major limiting factor in animals with long term post operative survival periods following total artificial heart replacement. Thrombi are formed on the artificial valves, the biomaterials and in stagnation areas within the artificial ventricles. In design planning the stagnation areas should be avoided as well as major turbulences. The filling volume should be maximally used for the stroke volume and the epicenter of the membrane should be underneath the valve areas. The ellipsoid heart eliminates stagnation areas and the stroke volume is 82% of the filling volume. The maximum cardiac output is 15.8 l/min. The ellipsoid heart was implanted in 20 female calves; the maximum length of survival was 213 hr. There was no compression of the inferior vena cava and the heart fitted well into the chest of the animals. The cardiac output, self regulated in the sense of Starling's law, was adequate to perfuse the animals and to allow moderate exercise such as standing. The arterial pressure curves show normal physiological activity. The curves in both atria are unphysiological, owing to relative insufficiency of the valves. The limiting factors were pulmonary insufficiency and surgical complications. The ventricles showed no thrombus formation, except in one case, in which faulty material was the predisposing cause. It was possible to develop an automatic driving system on the basis of these experiments. Regulation occurred by means of gas flow control in driving tubes, whereby the form of the gas flow curve provides information on position of the membrane. As soon as the membrane has reached the end diastolic position, systole is triggered off and lasts until the end systolic position is reached. If the venous return is increased, the ventricles are filled more rapidly and the heart is driven at a higher rate. One part of the ellipsoid heart is used as ventricle for assisted circulation. The left ventricle is cannulated via the left appendage or the apex. The ventricle relieves the left heart to a large extent and the cardiac output is taken over by the pump placed in a paracorporeal position. The blood is directed back into the thoracic aorta.

3609. Cardiac blood pool imaging over the complete cardiac cycle with a multiformat imager - Silverstein E.A., Turner D.A., Fordham E.W. and Chung Bin A. - Rush Presbyt. St Luke's Med. Cent., Chicago, Ill. 60612 USA - J.NUCL.MED. 1977 18/2 (159-162)

A new method of obtaining scintigraphic images of the cardiac blood pool for the study of ventricular wall motion is described. The method, which is based upon an inexpensive modification of a commercial multiformat imaging device, yields a set of serial gated images covering the entire cardiac cycle. These images may be converted into a film loop to yield a continuous motion picture of the mechanical cycle of the heart.

6.8. Respiration

3610. Introduction to SI units, with special reference to pulmonary function - Visser B.F. - Gould Godart, Bilthoven NET - BIOMED.TECHN. 1976 21/7 (206-212)

The international System of Units knows seven base units - all other units are derived. In pulmonary function it is of advantage to use a sub system consisting of three base units for time (t), amount of substance (n) and temperature (T), and two derived units for volume (V) and pressure (P). Most other units can be derived from this set of five. Special attention is paid to the difference between flow and volume rate. When the litre is chosen as the non coherent unit of volume, the kilopascal should be taken as the non coherent unit of pressure, because only then is their product expressed in the International System of Units (SI) unit of energy, the joule (J). Their system of units, therefore, consists of the second (s), mole (mol), kelvin (K), litre (l) and kilopascal (kPa). In the mechanics of breathing, units are derived from s, l and kPa only, in gas exchange physiology and acid base chemistry, the mole must be added. The designation 'concentrability' or 'volumic (substance) capacitance' is proposed instead of 'capacitance coefficient'. It is suggested that the temperature scale be changed in such a way that the universal gas constant will equal 1 SI unit. A formula is presented to calculate saturated water vapour pressure as a function of T.

3611. New respiratory gas valve support for graded exercise studies - Ellis D.G. and Lampman R.M. - Dept. Phys. Med., Univ. Michigan Med. Cent., Ann Arbor, Mich. 48104 USA - J.APPL.PHYSIOL. 1976 41/6 (939-941)

The authors describe a new support structure for respiratory gas valves for use in exercise studies. Use of this structure largely avoids problems of large inertial reactions and feelings of confinement on the part of the subject which have characterized previous systems. The support mechanism consists of a spring reacted, pivoted boom carried on the end of a counterbalanced swinging beam. This device was designed for use on an adjustable slope motor driven treadmill, but may be adapted to a variety of other experimental arrangements.

3612. A spirometer for the continuous measurement o expired tidal volume - Chakrabarti M.K., Selman B.J and Whitwam J.G. - Dept. Anaesth., Roy. Postgrad Med. Sch., London ENG - BRIT.J.ANAESTH. 1977 49/1 (83-85)

A spirometer is described for the continuous breat by breath measurement of expired tidal volume (VE This spirometer differs from other similar equipment in using a pneumotachograph to define the duration of the inspiratory phase.

3613. An improved percutaneous jetting system for us during microlaryngeal operations - Carden E., Becker G. and Hamood H. - Dept. Anesthesiol., UCLA Sch Med., Los Angeles, Calif. 90024 USA - CANAD.ANAESTH.SOC.J. 1977 24/1 (118-125)

Studies carried out in the laboratory have shown that an S shaped cannula for trans laryngeal jet ventilation provides a distinct advantage over conventional straight ones. Tidal volumes are large and the cannula is more stable in position. The tendency to perforate the posterior wall of the trachea during introduction is also minimal. Blood gas data obtained from patients being operated upon with this technique of anaesthesia show that it provides very adequate ventilation and can be effectively used with balanced anaesthesia if a nitrou oxide oxygen blender is incorporated into the jetting system. It can be put in position before induction of anaesthesia to enable preoxygenation and assist ventilation and can be left in place at the end of the operation until the patient is breathing adequately. I necessary, a tracheostomy can be done with the cannula in situ.

3614. Speech recognition by machine: a review - Reddy D.R. - Computer Sci. Dept., Carnegie Mellon Univ., Pittsburgh, Pa. 15213 USA - PROC.IEEE (N.Y.) 1976 64/4 (501-531)

This paper provides a review of recent developments in speech recognition research. The concept of sources of knowledge is introduced and the use of knowledge to generate and verify hypotheses is discussed. The difficulties that arise in the construction of different types of speech recognition systems are discussed and the structure and performance of several such systems is presente Aspects of component subsystems at the acoustic, phonetic, syntactic, and semantic levels are presente System organizations that are required for effective interaction and use of various component subsystem the presence of error and ambiguity are discussed.

15. Automatic speaker verification: a review - osenberg A.E. - Bell Lab., Murray Hill, N.J. 07974 SA - PROC.IEEE (N.Y.) 1976 64/4 (475-487)

The relation of speaker verification to other pattern cognition problems in speech is discussed, pecially the distinction between speaker verification nd speaker identification. The prospects for tomatic speaker verification, its settings and plications are outlined. The techniques, evaluations, nd implementations of various proposed speaker cognition systems are reviewed with special nphasis on issues peculiar to speaker verification. wo large scale operating systems using different nalysis techniques and applied to different setting re described.

616. Automatic recognition of speakers from their oices - Atal B.S. - Bell Lab., Murray Hill, N.J. 07974 JSA - PROC.IEEE (N.Y.) 1976 64/4 (460-475)

This paper presents a survey of automatic speaker ecognition techniques. The paper includes a iscussion of the speaker dependent properties of the peech signal, methods for selecting an efficient set of peech measurements, results of experimental studies llustrating the performance of various methods of peaker recognition, and a comparison of the erformance of automatic methods with that of uman listeners. Both text dependent as well as text ndependent speaker recognition techniques are discussed.

3617. Synthesis of speech from unrestricted text - Allen J. - Res. Lab. Electron., Dept. Electr. Engin. Computer Sci., MIT, Cambridge, Mass. 02139 USA - PROC.IEEE (N.Y.) 1976 64/4 (433-442)

For many applications, it is desirable to be able to convert arbitrary English text to natural and intelligible sounding speech. This transformation between two surface forms is facilitated by first obtaining the common underlying abstract linguistic representation which relates to both text and speech surface representations. Calculation of these abstract bases then permits proper selection of phonetic segments, lexical stress, juncture, and sentence level stress and intonation. The resulting system serves as a model for the cognitive process of reading aloud, and also as a stable practical means for providing speech output in a broad class of computer based systems.

3618. Computers that talk and listen: man machine communication by voice - Flanagan J.L. - Acoustics Res. Dept., Bell Lab., Murray Hill, N.J. 07974 USA - PROC.IEEE (N.Y.) 1976 64/4 (405-415)

Computer techniques now emerging in the laboratory promise new capabilities for voice communication between man and machine. Three modes of interaction are of special interest: computer voice readout of stored information, automatic verification of a caller's identity by means of his voice signal, and automatic recognition of spoken commands. Applications extend to: voice directed installation of telephone equipment, authentication by voice of a credit customer or of an individual requesting readout of privileged information, and voice controlled services such as repertory dialing or automatic booking of travel reservations.

3619. Magnifying laryngostroboscopy (Germ) - DIE LUPENSTROBOSKOPIE - Barth V. - HNO Klin., Univ. Saarlandes, Homburg/Saar GFR - H.N.O. (Berl.) 1977 25/1 (35)

A procedure for stroboscopic observation of vocal cord vibrations by means of a magnifying laryngoscope is reported. In addition, the clinical problems which can be managed successfully by this procedure are discussed.

3620. FIO$_2$ and flow patterns in Bird MK 8 and MK 14 with loading (Ital) - FIO E ONDE DI FLUSSO NEI BIRD MK 8 MK 14 SOTTO CARICO - Busato G., Alemanno F. and Porati U. - Serv. Anest., Rianim., Osp. Reg., Treviso ITA - ACTA ANAESTH.ITAL. 1976 27/5 (785-798)

The oxygen concentration in inspired gas (FI02) when the Bird MK 8 and 14 ventilators were used, was unpredictable both when oxygen as air was used and as the driving gas. Influences of changes of compliance of resistance remained unavoidable. It is concluded that frequent control of FIO2 and of the tidal volume is mandatory when these ventilators are in use.

3621. Fiberoptic laryngoscope guide and protector - Wang J.F. - Dept. Anesth., Univ. Alabama Med. Cent., Birmingham, Ala. 35294 USA - ANESTH.ANALG.CURR.RES. 1977 56/1 (126-127)

To facilitate oral fiberoptic laryngoscopy and to protect the laryngoscope, a Portex #3 oral airway has been modified.

3622. Clinical evaluation of a microporous membrane oxygenator - Karlson K.E., Vargas L.L., Cooper G.N. Jr. et al. - Dept. Surg., Rhode Island Hosp., Providence, R.I. 02903 USA - J.CARDIOVASC.SURG. (TORINO) 1977 18/1 (71-75)

The microporous membrane oxygenator has a maximum priming volume of 400 ml. and transfers up to 250 ml. of O . CO transfer is excessive when ventilating the oxygenator with 100% O . CO should be added to the ventilating gas. The oxygenator has performed satisfactorily in 90 cases of cardiac surgery with perfusion time up to nine hours. Precautions are described to prevent possible accumulation of water vapor in the oxygenator.

6.9. Reproductive system

3623. A comparison of flexible and nonflexible plastic cannulae for performing first trimester abortion - Andolsek L., Miller E. and Bernard R. - Fam. Planning Inst., Univ. Ljubljana YUG - INT.J.GYNAEC.OBSTET. 1976 14/3 (199-204)

The safety and effectiveness of flexible and nonflexible plastic cannulae used in vacuum aspiration abortion for patients at 6 to 12 weeks' gestation were evaluated in a study of 1100 physically healthy women in Ljubljana, Yugoslavia. To minimize study biases, each type of cannulae was randomly assigned to 550 patients. To minimize evaluator bias, a second physican who was kept unaware of which cannula was used for a particular patient was responsible for evaluating patients after the procedures. Both groups of patients were similar with respect to age, parity, marital status, formal education and gestational age. Higher rates of retained tissue and cannula obstruction were obtained with the flexible cannula. The two types of cannulae were not significantly different wth respect to the other criteria of evaluation.

3624. An improved mechanical strain gauge for recording penile circumference change - Laws D.R. and Bow R.A. - Atascadero State Hosp., Atascadero, Calif. 93422 USA - PSYCHOPHYSIOLOGY 1976 13/6 (596-599)

The re design of a mechanical strain gauge for recording penile circumference change is described. Basic modifications included doubling the thickness of the spring steel used in the penile ring, the use of larger strain gauges with a greater strain range, and a different method for protecting the gauge assembly. These design changes produced a more robust unit with greater longevity than the original.

3625. The effect of an extraluminal transducer on the reproductive capability of the rabbit - Fromm E., Garcia C.R., Jeutter D.C. et al. - Biotelemetry Lab., Biol. Sci. Dept., Biomed. Engin. Sci . Program, Drexel Univ, Philadelphia, Pa. 19104 USA - FERTIL.STERIL. 1976 27/12 (1459-1466)

An extraluminally attached microminiature force transducer, designed for reproductive tract contractility measurements, was investigated in terms of its effects on the physiology of the uterotubal junction in the rabbit. The presence or attachment process of the extraluminal force transducer (EFT) did not affect the rate of pregnancy or the number of embryonic implantation sites whether the attached device was silicone rubber or polyethylene encased. The uterotubal junction was able to retain the blastocyst for the required time after mating, while an examination of postembryonic mortality revealed a rate of one resorption in some experimental groups. The gestation period was unaffected by the EFT, ranging from 30 to 40 days with a mode of 32, while histologic examinations revealed formation of a thin fibroblastic layer, some increased vascularity, and no abnormal leukocytic accumulation.

3626. Ultrasonic propagation properties of mammalian testes - Brady J.K., Goss S.A., Johnston R.L. et al. - Bioacoust. Res. Lab., Univ. Illinois, Urbana, Ill. 61801 USA - J.ACOUST.SOC.AMER. 1976 60/6 (1407-1409)

The ultrasonic absorption and reflection properties of sexually mature, freshly excised mouse, rabbit, cat, and dog testes have been investigated at 37°C in the frequency range 0.5-7 MHz by the transient thermoelectric absorption, the pulse reflection, and the pulse transmission methods. The absorption coefficient is found to exhibit values considerably less than those of other parenchymal tissues and to possess a frequency dependence mimicking a simple relaxation process of characteristic frequency approximately 0.9 MHz.

6.10. Urinary tract

3627. Electronic urethrocystometry before and after Zoedler's repair operation (Germ) - ELEKTRONISCHE URETHRO ZYSTOMETRIE VOR UND NACH ZOEDLER PLASTIK - Methfessel H.D., Roepke F. and Methfessel G. - Frauenklin., Martin Luther Univ., Halle/Wittenberg GDR - ZBL.GYNAK. 1976 98/19 (1191-1197)

Electronic measurements were made of pressure in the bladder and urethra of 9 incontinent women treated by Zoedler's repair operation. A comparison of the pre and postoperative levels yielded the following results: The functional length and the closing pressure of the urethra show uncharacteristic changes of the levels only. The expected postoperative rise of the levels did not occur. The vesicourethral quotient at strain (pVmax/pUmax), with the exception of one case, corresponded to the result of the operation. The clinical recovery from incontinence after Zoedler's repair operation is connected with small changes in the pressure graphs only.

3628. Management of urinary incontinence with electronic stimulation: observations and results - Sothiropoulos A., Yeaw S. and Lattimer J.K. - Squier Urol. Clin., Babies Hosp., Coll. Phys. Surg., Columbia Univ., New York, N.Y. USA - J.UROL. (Baltimore) 1976 116/6 (747-750)

The evolution in the management of urinary incontinence with electronic stimulation of the pelvic floor is reviewed. The effect of stimulation is analyzed. Our methods of candidate screening and the contraindications to treatment are discussed. Forty patients were treated for 2 to 15 months. Sixteen patients were post prostatectomy, 4 had stress incontinence, 4 had upper motor neuron lesions, 1 was incontinent after repair of a rectovesical fistula and 15 were post bladder exstrophy closure. The success rate in the first group was 45.4 per cent, in the second group 100 per cent, in the third group 50 per cent, in the fourth group 100 per cent and in the fifth group 27.2 per cent. In view of the method having been tried on cases resistant to other forms of treatment the results were encouraging. The most satisfying results were in the post exstrophy group in which no response was expected.

3629. An improved helical stone basket - Rutner A.B. and Fucilla I.S. - Div. Urol., Dept. Surg., Stanford Univ., Palo Alto, Calif. USA - J.UROL. (Baltimore) 1976 116/6 (784-785)

Modern technological methods and materials have been used to redesign and improve upon the retractable, spiral stone basket. The result has been the development of a reasonably inexpensive, safe d more successful instrument.

30. Instruments for sampling and measuring the lume output of urine from grazing female sheep - hambers A.R.M., White I.R., Russel A.J.F. and ilne J.A. - Hill Farming Res. Organ., Bush Estate, nicuik ENG - MED.BIOL.ENGINEERING 1976 /6 (665-670)

Urinary measuring and sampling equipment .m.a.s.e.) suitable for use with grazing female sheep described. The equipment, which weighs 2.8 kg and equally distributed on either side of the sheep, easures the volume of urine excreted per 24 h and llects a sample which can be varied from 1 to 10% the total output. The results of experiments howed that catheterisation of the bladder and tachment of u.m.a.s.e. did not affect daily urine lume or composition, that urine volumes estimated om u.m.a.s.e. varied between 98.5 and 104.3% of bserved volumes, and that the sample collected by .m.a.s.e. was compositionally representative of the tal daily urine output. The equipment has been hown to work satisfactorily with both penned and razing sheep.

631. Microcapsule artificial kidney: Including updated reparative procedures and properties - Ming Swi hang T. - Artificial Organs Res. Unit, Dept. hysiol., Dept. Med., McGill Univ., Montreal CAN - IDNEY INT. 1976 10/sup.7 (218-224)

This is a review of the pioneer work carried out in ontreal of the construction of a kidney capsule ontaining 300G of albumen cellulose nitrated microencapsulated activated coconut charcoal. The terilising and microencapsulation procedures are lescribed to avoid pyrogen reactions. aemoperfusion is detailed with the heparin equirements and clearance characteristics described gainst standard haemodialysis machines, middle molecules, creatinine and drugs are cleared at a faster rate. The amalgamation of this system together with microencapsulated urease and ammonium adsorbents suggests future developments.

3632. Towards a wearable artificial kidney - Kolff W.J., Jacobsen S., Stephen R.L. and Rose D. - Div. Artific. Organs, Coll. Med., Univ. Utah, Salt Lake City, Ut. USA - KIDNEY INT. 1976 10/sup.7 (300-304)

The wearable kidney relies on three advances; the Jacobsen pump which, from a light battery source, moves dialysate in one direction and blood in the other; the dialysate can be circulated while the patient is ambulant through an adsorbent charcoal column and later via the 20 litre container of dialysate in addition; the dialyser used is a Model 4 Cordis Dow Hollow Fibre (1.4 m^2). Ultrafiltration is highly variable from 4 to 700 ml/hour bled off into an accumulator and reservoir. Average removal of ultrafiltrate sodium, creatinine, uric acid, urea and potassium per dialysis after ± two hours per day for six consecutive days is within the range of removal of these substances by the natural kidneys in a normal man. Examples are given of the control of uremia in one subject over a period of three weeks.

3633. The Gibbons indwelling silicone ureteral stent catheter - Danoff D.S. - Sect. Urol., Dept. Surg., Cedars Sinai Med. Cent., Los Angeles, Calif. USA - J.UROL. (Baltimore) 1977 117/1 (33)

A method is described to facilitate the placement of the Gibbons indwelling silicone ureteral stent catheter using 2 ureteral catheters. The smaller catheter is placed within the silicone stent and the larger one is placed over the smaller catheter, fixing the ureteral stent within the obstructed ureter.

6.11. Nervous system

3634. Visual field analyser: assessment of delay and temporal resolution of vision - Regan D., Varney P., Purdy J. and Kraty N. - Wilkinson Sword (Res.) Ltd, Colnbrook, Slough ENG - MED.BIOL.ENGINEERING 1976 14/1 (8-14)

The delay campimeter provides a simple and inexpensive means of detecting and measuring abnormality slowed transmission of visual signals from the eye to the brain. Such measurements can assist in the diagnosis of multiple sclerosis. This test can be carried out in 10 min. In an alternative mode of use, a double flash method is used to assess the extent to which visual signals leaving the eye are sharply defined along the time axis. Additionally, visual sensitivity to flicker can be measured by sinewave modulating light intensity. Visual stimulation is by switching on, switching off, pulsing or modulating light emitting diodes, whose relative timing is controlled electronically.

3635. A new design for an implantable hearing aid - Nunley J.A., Agnew J. and Smith G.L. - Vicon Instrument Co., Colorado Springs, Colo. USA - ISA TRANS. 1976 15/3 (242-245)

There have been attempts to design a totally implantable hearing aid but, so far, the devices described in the literature have had various disadvantages. This paper describes a new type of hearing aid that is being implanted and tested in chinchillas. This device parallels the natural hearing mechanism and operates in conjunction with residual hearing, while providing amplified drive to the ossicular chain. Implantation procedures and results are described and discussed.

3636. Development of telemetric techniques for use in studies of the electrical activity of the brain - Simard J.M., Schneider G.T. and Turbes C.C. - Creighton Univ., Omaha, Nebr. USA - ISA TRANS. 1976 15/3 (246-252)

A telemetry system has been designed to transmit two channels of wideband activity (0.2 H2-2.5 KHz) recorded from high impedance microelectrodes in the brains of free moving cats. Thus, but unit activity and slow wave field activity are accessible without disruption of the animals' behavior. In addition, circuitry is described that conditions the receiver signals, that dicriminates valid subcarrier signals from receiver noise and that automatically aborts data output in the absence of discrimable subcarrier. This receiver signal processing circuitry thus assures the fidelity of the decoded subcarrier, greatly facilitates further machine processing of the data and frees the experimenter from having to continuously monitor the receiver signals to subjectively edit out noisy data.

3637. Body image: an apparatus for measuring disturbances in estimation of size and shape - Allebeck P., Hallberg D. and Espmark S. - Dept. Psychiat., Karolinska Hosp., Stockholm SWE - J.PSYCHOSOM.RES. 1976 20/6 (583-589)

There are few methods available for an objective and scientific assessment of the body image. We have developed a new TV system for this purpose. On a monitor is displayed the picture of the studied subject or of an external object. The subject can adjust the size and height/width proportions of the picture on the monitor and the deviations from correct measures can be read directly by means of electrical instruments. In a study, the adjustments made by a group of obese patients were compared to those made by a control group. The obese differed significantly in the adjustments of body proportions, tending to underestimate the height of their picture in relation to the width.

3638. Micro tremor of the eyes of comatose patients - Shakhnovich A.R. and Thomas J.G. - Burdenko Inst. Neurosurg., Moscow USS - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 1977 42/1 (117-119)

An electronic method has been used to record th micro tremor of the eyes of a group of comatose patients. Changes in the micro tremor waveform patterns have been observed in successive records taken over a period of several days. These changes have been associated with changes in the depth of coma.

3639. Dead zone limiter: an application of conditional tests in nonparametric detection - Kassam S.A. and Thomas J.B. - Dept. Syst. Engin., Moore Sch. Electr. Engin., Univ. Pennsylvania, Philadelphia, Pa. 19174 USA - J.ACOUST.SOC.AMER. 1976 60/4 (857-862)

The concept of a conditional statistical test is applied to obtain a nonparametric detector based on the dead zone limiter nonlinearity. The resulting detector is easily implemented, and its performance is shown to be superior to that of the sign detector for both large and small samples.

3640. Electroencephalogram recording of sleep in the home - Wilkinson R.T. and Mullaney D. - MRC Appl. Psychol. Unit, Cambridge ENG - POSTGRAD.MED.J. 1976 52/Sup 7 (92-96)

The Medilog has been used to record the electroencephalogram (EEG) and electro ophthalmogram (EOG) for sleep stage analysis on a small group of normal volunteer subjects. The recordings have been written out in full, and scored by two experienced scores, with a high level of agreement indicating that the quality of recordings was fully satisfactory for the purpose. Direct comparisons between Medilog recordings and norma direct recordings, over a limited period, also show good agreement.

3641. The LP seat: A device for positioning and restraining infants and children for lumbar puncture - Pretlow R.A. III. - Univ. Virginia Hosp., Charlottesville, Va. USA - PEDIATRICS 1977 59/1 (128-129)

A new device is available which automatically positions and restrains infants and small children while lumbar punctures are performed on them. The device is called the 'LP Seat'. It was designed specifically to make spinal taps on children easier and safer to do than when they are held by the conventional hand method.

3642. Improved technique for continuous measuremen of in vitro transport into brain synaptosomes - Gonc F. and Pujol J.F. - Dept. Med. Exp., Univ. Claude Bernard, Lyon FRA - J.NEUROCHEM. 1977 28/1 (245-247)

This paper describes an apparatus which allows a continuous analysis of the active transport of C labelled substrates by synaptosome enriched fractions, and which avoids the necessity for the extraction of the particles from the incubation medium.

3643. Model studies of lateral inhibition as a mechanism of movement detection. I. Analytical consideration of direct inhibition (Russian) (Russ) - Lednitsky D.G. - State Univ., Dniepropetrovsk USS BIOFIZIKA 1977 22/1 (127-132)

Physiological studies show that lateral inhibition is involved in movement detection and suggest that an essential role in this process is played by such factor as an initial delay of inhibition, final velocity of propagation and its gradual reduction as the inhibition mediator is disintegrated 'memory' of inhibition. A mathematical model of dynamic lateral inhibition is proposed to check up this suggeston and to determine the role of each of these factors. An analytical investigation of the direct inhibition model confirms the participation of these factors in the separation of the reaction to movement. It is found that the delay of inhibition and the final velocity of its propagation are the factors, which favour movement separation and do not impose restrictions on spacial characteristics of inhibition providing for the fulfilment of the known functions of stationary lateral inhibition. Restrictions appear in the case when movement separation is determined by the delay and 'memory' of inhibition.

3644. Sensory inputs to the hippocampus of the cat: field potentials - Habets A.M.M.C., Bosland M., Lopes Da Silva F.H. and Mollevanger W.J. - Dept. Veter. Med., Univ. Utrecht NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (93-99)

A possibly olfactory path to the hippocampus has been described anatomically. This was tested by electrophysiological methods. A clear evoked tential with a latency of about 25 msec was found the hippocampus after stimulation of the epyriform cortex. By field potential analysis quipotential maps), this response showed a maximal atial gradient in the outer dendritic layer of the scia dentata (stratum moleculare) and the CA_1 area. is suggests that the olfactory input reaches the ppocampus via the perforant path. Unit recordings ggest that the nature of this response is, in first stance, excitatory.

45. The hippocampal EEG correlates of motoracts in e dog - Arnolds D.E.A.T., Lopes Da Silva F.H. and tink W. NET - ROGR.REP.MED.FYS.INST.TNO 1976 no.4 (100- 6)

It is shown that statistically significant modulations ccur in the power spectral properties of the ppocampus EEG that are correlated with: The ansition from walking to standing; The transition om standing while eating to walking away from the od dish; Each head movement in a learned series of ead movements; Each separate step in a slowly alking dog. Behavioral transitions to a more active ate are generally accompanied by an increase in nplitude and frequency in the theta band of the ippocampal EEG and an increase in the rhythmicity f this signal. Behavioral transitions to a less active ate show the reverse relationships with hippocampal EG.

6.12. Receptors

646. An improved slice level for digital color coding chographic unit (Japanese) (Japa) - Tane S., Muromoto M., Ito K. and Kimura Y. - Dept. Ophthalmol., St Marianna Univ., Sch. Med., Kanagawa JAP - JAP.J.CLIN.OPHTHAL. 1976 0/11 (1311-1312)

The following characteristics of echogram color coding ophthalmic diagnostic equipment with a color coding unit slicing 2 decibels intervals for use in imultaneous tomogram method were determined. First, ophthalmic ultrasonic diagnostic findings using color coding make the diagnosis easier. Second, the arrow dynamic range defects of conventional quipment can be greatly improved upon, and a scale of wide echo pulse range can be shown by color or monochrome coding. Third, quantitative diagnostic tomographic findings can be obtained and the memory equipment enables the picture from one scanning to be fixed and preserved for a long period to be used when needed. These merits also increase the applicability of equipment to clinical applications.

3647. Apparatus to measure interference fringe visual acuity and modulation transfer function (Japanese) (Japa) - Sugimachi Y., Futenma M., Itoi M. et al. - Dept. Ophthalmol., Juntendo Univ., Sch. Med., Tokyo JAP - JAP.J.CLIN.OPHTHAL. 1976 30/11 (1319-1323)

An apparatus for measuring the interference fringe visual acuity (IVA) and the modulation transfer function of retina brain system (MTF) was developed. It projects an interference fringe pattern formed by a coherent light source, a helium neon laser, directly on the retina. The measured IVA is shown directly by the digital indicator, and the modulation sensitivity is printed out after passing through the calculating circuits. The apparatus is resistant to vibration, easy to handle, small in size, and rapid measurement of IVA or MTF by a technician or an ophthalmic assistant is possible in a busy outpatient clinic.

3648. A description of a method for objective perimetry (Germ) - DIE FERNSEHBILDANALYSE: EIN MESSVERFAHREN ZUR OBJEKTIVEN PERIMETRIE - Jensen W. - Abt. Ophthalmol. Elektrophysiol., Univ. Augenklin., Hamburg GFR - ALBRECHT V.GRAEFES ARCH.OPHTHAL. 1976 201/2 (183-191)

An infrared sensitive TV camera was fitted into a projection perimeter, which allows control fixation independent of the particular background illumination. The consensual pupil light reflex, triggered by the test light of the perimeter, is measured and registered with a special TV processor designed for this purpose. The method was tested for its efficiency on 4 healthy volunteers. The course of sensory and pupillomotor thresholds were measured on the 135 meridian of the visual field. Determinations were conducted in the photopic range of 10 asb background illumination with 2 test points of 27' and 7'. A difference of 10 dB was found between the sensory and pupillomotor thresholds.

3649. The ac and dc components in lateral line microphonic potentials - Boston J.R. - Biotechnol. Program, Carnegie Mellon Univ., Pittsburgh, Pa. 15213 USA - J.ACOUST.SOC.AMER. 1976 60/3 (656-664)

Measurements of the microphonic potential from the lateral line sensory organs of killifish (Fundulus heteroclitus) are presented in this report. The potential consists of a dc shift and a dominant oscillatory component at twice the frequency of the stimulus, and it grows with the square of the stimulus at low amplitudes. An electrical circuit model of the microphonic is developed, assuming a simple quadratic nonlinearity in the electrical response of an individual hair cell as suggested by Flock. The model allows investigation of variable conductive or variable capacitive effects in microphonic generation, and the results obtained from the model are compared to the observed properties of the microphonic potentials. It is concluded that hair cell microphonics appear to be generated by a process involving current flow through a variable conductance, although capacitive effects of the hair cell are important in determining the waveform of the microphonic and its behavior as a function of frequency. A discrepancy between the observed low amplitude growth of the microphonic in killifish and the reported low amplitude growth of the microphonic in other acoustico lateralis preparations is also discussed.

3650. Speech sound discrimination by monkeys and

humans - Sinnott J.M., Beecher M.D. and Moody D.B. andStebbins W.C. - Prim. Lab., Kresge Hearing Res. Inst., Univ. Michigan, Ann Arbor, Mich. 48104 USA - J.ACOUST.SOC.AMER. 1976 60/3 (687-695)

Old World monkeys were trained with an operant conditioning technique to discriminate the natural speech sounds /ba/-/da/ and transferred to synthetic speech. Human and monkey difference thresholds for formant transitions were then compared along a seven step /ba/-/da/ continuum. Monkeys were not as sensitive as humans to differences in formant transition: the just noticeable difference for monkeys was about 320 Hz, and for humans, about 160 Hz. Although humans were more adept at intraphonemic discriminations than monkeys, their latencies to stimulus changes revealed evidence of 'categorical perception' of the continuum: While latencies for the monkeys increased linearly as stimulus difference was decreased, human latencies were essentially constant for all interphonemic comparisons, but increased sharply for intraphonemic comparisons. We view these data as evidence for similar sensory capacities in monkeys and humans, but unique speech processing capacities in humans.

3651. An investigation of speaker height and weight identification - Lass N.J. and Davis M. - Speech Hearing Sci. Lab., West Virginia Univ., Morgantown, W.V. 26506 USA - J.ACOUST.SOC.AMER. 1976 60/3 (700-703)

The purpose of this investigation was to determine if listeners were capable of speaker height and weight identifications from recorded speech samples. A standard prose passage was recorded by 30 speakers, 15 females and 15 males. A master tape containing the randomly arranged recorded readings of all speakers was played to a group of 30 subjects for speaker height and weight identification purposes. All subjects participated in two experimental sessions. In one session they were asked to determine the height of each of the speakers on the tape, and in another session weight judgments were made. The order of presentation of the height and weight tasks was randomized so that 15 subjects made height judgments first while 15 subjects made weight judgments first. A multiple choice response sheet containing four choices for the judgment of height and weight for each speaker was provided. Results indicate that the subjects were capable, with slightly better than chance guessing accuracy, of identifying the heights of male and female speakers and the weights of male speakers when presented with only their recorded speech samples. Implications of these findings and suggestions for future research are discussed.

3652. Acoustic reflex, loudness summation, and the critical band - Scharf B. - Auditory Percept. Lab., Northeast. Univ., Boston, Mass. 02115 USA - J.ACOUST.SOC.AMER. 1976 60/3 (753-755)

As the bandwidth of a sound increases up to the critical bandwidth, loudness remains constant so long as overall intensity is constant. To keep loudness constant at wider bandwidths, intensity must be reduced. Similarly, the minimum intensity required to activate the acoustic reflex (AR) is constant as bandwidth is increased up to a critical value; beyond that value, intensity can be reduced. This critical width is much wider for the AR than for loudness summation. The literature and some new data show that the difference does not arise simply because the AR is measured at signal levels higher than those at which loudness summation is usually measured. Measured at the same high signal levels as needed to activate the AR, the critical band in loudness summation appears to be about two times wider than at lower levels; the 'critical bandwidth' measured for the AR is some four to six times wider. Moreover, the AR shows a strong dependence on the number of components in a multitone complex, whereas loudness summation does not. Also, at very wide bandwidths the AR threshold shows a much larger decrease than would be predicted by the change in loudness. These differences suggest that the AR is nc a direct corollary of loudness.

3653. Studies on cyclophoria and cyclotropia with the Aulhorn phase difference haploscope (Japanese) (Japa - Awaya S., Nozaki H., Nakao M. et al. - Dept. Ophthalmol., Nagoya Univ. Sch. Med., Nagoya JAP ACTA SOC.OPHTHAL.JAP. 1976 80/10 (1009-1018

The amount of cyclodeviation was measured in 15 normal subjects with good corrected visual acuity, normal binocular function and no manifest horizonta or vertical deviation (ranging from 23 to 42 years of age) and 6 non operated cases (ranging from 18 to 56 years of age) of superior oblique muscle paresis for which myectomy of the ipsilateral inferior oblique muscle was performed. The measurements were made at the primary position in a 15 upward gaze and a 15 downward gaze either with or without background by using the Aulhorn phase difference haploscope from a distance of 2 meters, as well as with the synoptiscope. The following results were obtained. In the 15 normal subjects the shift of the mean value toward the excyclodeviation was statistically significant when measured in a 15 upward gaze with or without background. This migh suggest that a slight amount of extorsion of the eye i likely to occur in this position of gaze. No significan shift from 0 was obtained in the primary position with or without background. A statistically significan shift to excyclodeviation was observed in a 15 downward gaze with or without background. This may indicate that the eyes might extort in this position of convergence and depression where the 'excyclodeviation for near' surpasses the intortion that occurs in a downward gaze. Excyclophoria was observed more often than incyclophoria. In 6 cases o the non operated superior oblique muscle paresis, excyclophoria was encountered in 2 cases (primary position) and in 3 cases (downward gaze) which showed cyclodeviation in the dark without background but no cyclodeviation with background. In 6 cases of the operated superior oblique muscle paresis, no demonstrable cyclodeviation was observe in 5 cases in the primary position with or without background. Excyclophoria was found in addition to cyclotropia in some cases.

54. Problems of cochlear microphonic recording in an - Hoke M. - ENT Dept., Univ. Munster GFR - EV.LARYNG. (Bordeaux) 1976 97/sup. (473-486)
After outlining the most important requirements r the measuring technique, results of modelling periments are reported. Since the contribution of ner hair cells in the case of an impairment of outer ir cells becomes more significant, great attention is been paid to the behaviour of inner hair cells. mulating the corresponding recording conditions, ndings consistent with Dallos' 'inner hair cell cordings' coming from kanamycin treated animals ere obtained. A subsequent cancelling of the output the outer hair cells, beginning from stapes, leads to general depression of the magnitude curve of ochlear microphonics (CM) with a steeply falling irt at the frequency corresponding to the best equency of the place until which the outer hair cells e destroyed. The more outer hair cells are estroyed, the steeper the slope of the phase curve. or the time being, this model is still too simple to roduce significant results from a reverse ansformation of remotely recorded CM in man, but enables one to draw the following conclusions: nly the output of hair cells of the basal third of the ochlea contributes significantly to round window ecorded CM responses. Remotely recorded CM esponses to a distinct stimulus frequency cannot be elated to the excitation of hair cells at the place of he corresponding best frequency. CM measurements ithout phase determination are useless. As the CM ntegral depends highly upon the actual transfer unction of the middle ear, a suitable method for an xact determination of the middle ear transfer unction has to be found. If so, and if the required ecording conditions can be met, the reverse ransformation of round window recorded CM in uman beings could yield a certain information from he basal part of the cochlea.

655. Variations in acoustic admittance related to type f ear tip. A plea for a standardized method - imelfarb M.Z., Rapoport Y. and Shanon E. - Dept. ORL, Ichilov Hosp., Tel Aviv Univ., Tel Aviv ISR - SRAEL J.MED.SCI. 1976 12/11 (1289-1293)
In order to assess the validity of using various ear tips, tympanometry and acoustic admittance were studied in 20 young healthy subjects, with 3 different types of ear tip used to seal the external auditory canal. Significant variations in the admittance components and tympanometry curves were observed, resulting most probably from changes in the canal volume and the physical nature of the tips. It appears advisable to develop and adopt an appropriate, standard ear tip for studies of admittance audiometry.

3656. Problems encountered in development of instrumentation to measurement figure ground perception among young children - Rohr M.E. and Ayers J.B. - Tennessee Technol. Univ., Cookeville, Tenn. USA - PERCEPT.MOTOR SKILLS 1976 43/3II (1221-1222)
The purpose of this study was to report problems encountered in the measurement of visual figure ground perception. Conclusions from five related studies suggested that the skill may be a combination of related factors.

3657. Discrimination of pure tone intensities by the California sea lion - Moore P.W.B. and Schusterman R.J. - Dept. Psychol., California State Univ., Hayward, Calif. 94542 USA - J.ACOUST.SOC.AMER. 1976 60/6 (1405-1407)
On the basis of previous behavioral experiments on sound localization under water along with sound skull measurements in water, it was hypothesized that the California sea lion (Zalophus californianus) is capable of discriminating an intensity difference of approximately 3 dB at 16 kHz. The present experiment confirmed this hypothesis by means of a series of behavioral psychophysical experiments.

3658. Middle ear transmission in cats with experimentally induced tympanic membrane perforations - Kruger B. and Tonndorf J. - Dept. Otolaryngol., Coll. Phys. Surg., Columbia Univ., New York, N.Y. 10032 USA - J.ACOUST.SOC.AMER. 1977 61/1 (126-132)
A small perforation (2 mm) was placed in the posterosuperior quadrant of the feline tympanic membrane (TM). Sound pressures (amplitudes and phases) required for a 10 μV round window microphonic (CM) output was measured at third octave intervals from 200 to 4000 Hz (a) in front and behind the TM, (b) in open and closed sound systems, and (c) before and after perforation, as were the corresponding voltages across the transducer. Sound pressure (SP) changes in front of the TM after perforation revealed low frequency losses, identical in shape and magnitude for both open and closed sound systems, that vary inversely with frequency at a rate of 12 dB/octave below 1600 Hz. The transducer voltage changes, concomitant with SPs in front of the TM necessary to produce the criterion CM, paralleled the SP changes only in the open system. However, considerably larger voltage changes were found in the closed system, especially between 630 and 2000 Hz. Furthermore, from the SPs measured on both sides of the TM, the mean effective sound pressure (SP(eff)) acting on the TM was calculated. The changes in SP(eff), taken in reference to a constant CM output, demonstrate that a small TM perforation produces a 10 dB frequency independent loss in transmission.

3659. Comparison of sound transmission and cochlear microphonic characteristics in Mongolian gerbil and guinea pig - Schmiedt R.A. and Zwislocki J.J. - Inst. Sens. Res., Syracuse Univ., Syracuse, N.Y. 13210 USA - J.ACOUST.SOC.AMER. 1977 61/1 (133-149)
Characteristics of cochlear microphonic (CM) of guinea pigs, when compensated for electrical capacitive shunting within the cochlea, parallel corresponding mechanical characteristics. Specifically, good agreement is found for the middle ear transfer characteristic, basilar membrane phase, and cochlear

travel times. CM corrections derived from guinea pig experiments have been extrapolated to CM recorded in Mongolian gerbils to obtain estimates of middle ear and basilar membrane characteristics, a cochlear frequency map, and cochlear travel times for both animals. The estimates indicate that basilar membrane tuning curves are almost symmetrical in the apical turn. Model experiments suggest that the apparent sharpening of the low frequency leg of these curves is produced by a shunting effect of the helicotrema. Comparisons are also made among results obtained with three different electrode configurations: a single electrode in scala media (SM), a differential pair in scalae media and tympani (SM ST), and a differential pair in scalae vestibuli and tympani (SV ST). Results from both guinea pigs and gerbils indicate a slight advantage in the SM ST configuration.

3660. A guide to the design of electropupillometer (Japanese) (Japa) - Ikeda K. and Imai S. - Inst. Med. Dent. Engin., Tokyo Med. Dent. Univ., Tokyo JAP - JAP.J.MED.ELECTRON.BIOL.ENG. 1976 14/5 (405-410)

The design method of closed circuit TV pupillometer is discussed from two viewpoints, and a model is made. From the viewpoint of the safety of infrared illumination against the eye, illumination power 1 mW/cm was adopted, based on the fact of infrared exposed level of workers at glass or steel manufacturers and calculation of natural light exposed in our daily life. From another viewpoint of sensitivity and dynamic performance, silicon vidicon tube was adopted, together with good optical system. Its sensitivity is enough under the level of safe infrared illumination. By processing TV video signals electronically, the area, vertical diameter and horizontal diameter of the pupil can be measured. As the after image of this tube is reduced so much, the dynamic performance of this pupillometer is greatly improved to have the band width of about 5 Hz. A binocular electropupillometer was also made in order to measure both pupil diameter at one time. It will be possible to apply this binocular electropupillometer to clinical use.

3661. Human visual system. VI. Opposite colour difference and anticolour. Third series of experiments (Russian) (Russ) - Yarbus A.L. - Inst. Informat. Transm. Probl., Ac. Sci. USSR, Moscow USS - BIOFIZIKA 1977 22/1 (123-126)

The consideration of 'opposite colour differences' is continued. It is shown that the distortions of colour differences and of opposite colour differences, which arise because of the change of receptor sensitivity, are opposite to each other. Under certain conditons they can evoke the negative and positive after images.

3662. A new reflex free contact lens for fundus examination (Japanese) (Japa) - Iwata K. and Yaoeda H. - Dept. Ophthalmol., Niigata Univ. Sch. Med., Niigata JAP - JAP.J.CLIN.OPHTHAL. 1976 30/12 (1437-1439)

The authors devised a new contact lens for fundus examination without any reflex from the lens surface. The surface of the lens was designed obliquely to the incident light and the optical axis (87.5 , 85 and 82.5) instead of rectangular to it. The annoying flare and ghost from the surface reflex could thus be avoided. The distortion of the fundus image and the chromatic aberration resulting from the oblique surface were successfully eliminated by composing the lens material of three glass blocks with different refractive indices.

3663. Objective refractometry with laser speckle pattern (Japanese) (Japa) - Wada S. and Kato Y. - Tokyo Opt. Co., Ltd., Tokyo JAP - JAP.J.CLIN.OPHTHAL. 1976 30/12 (1441-1446)

A new laser speckle refractometer with built in image rotator was constructed. Preliminary examinations were performed on 30 eyes by a direct method (Erik Ingelstem) and by an indirect method (Daniel Malacara). Obtained data were weighed against those by subjective refractometry. A close correlation was present for both methods. As for Daniel Malacara's indirect method, the correlation index for spherical power was 0.985. The indices for cylinder power and axis were 0.955 and 0.946 respectively for astigmatism of more than 0.5 diopters. The indirect method was more practical than the indirect one because of the easiness of subjective determination.

3664. Design of aspherical +28D lens for indirect ophthalmoscopy (Japanese) (Japa) - Kajiura M., Okajima H. and Uehara M. - Dept. Ophthalmol., Fukushima Med. Coll., Fukushima JAP - JAP.J.CLIN.OPHTHAL. 1976 30/12 (1447-1450)

Technical data are presented for the newly devised aspherical lens for indirect ophthalmoscopy. This +28D lens allows the observation of large fundus area subtending an angle of 55 degrees. A bright fundus image can be obtained because of the considerable size of the lens (38.8mm in effective diameter). A distortion free fundus image is obtained with 2x magnification. The reflex from the lens surface was effectively eliminated with the use of multilayer coating. The lens weighs just 42g. It is also good for the examination of the fundus periphery. The lens promises to be of considerable clinical value as an adjunct or even as a replacement for the hitherto available +14D, +20D and +33D Nikon aspherical lenses.

3665. New design principles for visual acuity letter charts - Bailey I.L. and Lovie J.E. - Nat. Vision Res. Inst. Australia, Melbourne AUS - AMER.J.OPTOM.PHYSIOL.OPT. 1976 53/11 (740-745)

This paper introduces new principles for the design and use of letter charts for the measurement of visual acuity. It is advocated that the test task should be essentially the same at each size level on the chart. Such standardization of the test task requires the use of letters of equal legibility, the same number of letters on each row, and uniform between letter and between row spacing. It is also advocated that, bined with the test task standardization, there uld be a logarithmic progression of letter size. arts incorporating these design features have been de. These charts facilitate the use of nonstandard ing distances which might be used when there is visual acuity, when examination room layout vents testing at the standard distance, or when it necessary to validate visual acuity scores or detect lingering. Adjusting the visual acuity score ording to the chosen testing distance is simplified the use of logarithmic scaling.

6. The measurement and recording of vision at r test distances - Mehr E.B. and Freid A.N. - iv. California Sch. Optom., Berkeley, Calif. USA - IER.J.OPTOM.PHYSIOL.OPT. 1976 53/6 (314- 7)

Confusion and misconceptions characterize the ignation of near visual acuities because of the merous systems in use. Most of these systems do t lend themselves to accurate or easy usage or to nparison with other test distances. Use of the M stem, with the actual test distances recorded in ters, is suggested as a simplified system for ndardization.

67. A lubrication theory model of tear exchange der a soft contact lens - Hayashi T. and Fatt I. - h. Optom., Univ. California, Berkeley, Calif. 94720 SA - AMER.J.OPTOM.PHYSIOL.OPT. 1976 53/3 1-103)

Tear exchange due to squeezing of a soft contact ns onto the cornea by the lid is calculated from rication theory. The theory predicts that for a rmal blink and the usual tear film thickness (8 to microns) there will be a 10 to 20% tear exchange each blink.

6.13. Locomotor apparatus

68. The surgical treatment of gonarthrosis (Dutch) utc) - Van Rens Th.J.G. and Huiskes R. - Univ. lin. Orthop., Nijmegen NET - NED.T.GENEESK. 76 120/31 (1322-1333)

Current possibilities with regard to the surgical eatment of arthrosis deformans of the knee joint are viewed. A brief discussion is presented of the omechanical principles on which the therapeutical easures are based. Subsequently, the authors discuss e indications and contraindications of the various rgical possibilities, as well as the question in what age of gonarthrosis operation is to be considered.

669. Comparison of functional performance after IcKee Farrar, Charnley, and Muller total hip eplacement; A six month follow up of one hundred ixty five cases - Murray M.P., Gore D.R., Brewer .J. et al. - Kinesiol. Res. Lab., VA Cent., Wood, Iilwaukee, Wis. 53193 USA - CLIN.ORTHOP. Phila.) 1976 No. 121 (33-43)

Measurements of functional performance were ompared before and at 6 months after 58 McKee arrar, 50 Charnley, and 57 Muller total hip eplacements in 143 patients. The measurements included: range of motion of the hip, hip abductor and adductor muscle torque, weight bearing activity during standing, forces applied to canes or crutches, and multiple components of walking performance. Each group of patients improved significantly after surgery in all of the components measured. Early postoperative differences among the 3 groups were found with respect to pain ratings, impressions of hip status, hip motions, muscle torque, the number of patients using assistive devices, and certain components of walking performance. There is nothing to suggest that the performance of any 1 group is distinctly better or worse than that of any other group 6 months after surgery. On the basis of average values, each group improved in every component of function and it is gratifying that, except for a few patients who developed postoperative infection, each patient could be considered to have successful reconstruction.

3670. Semiconstrained total elbow arthroplasty - Schlein A.P. - 837 Fairfield Ave., Bridgeport, Conn. 06604 USA - CLIN.ORTHOP. (Phila.) 1976 No. 121 (222-229)

Diminution of elbow function may be both embarrassing and severely disabling, especially in patients with multiple arthritic joints. Over the past century, multiple techniques of soft tissue reconstruction of the elbow have been advocated. In general, they do not compare well with total elbow arthroplasty. Arthrolysis has often resulted in little improvement of elbow motion and interposition arthroplasty to instability. Synovectomy may however offer satisfactory relief of disability for the rheumatoid elbow provided that initially there is little evidence of joint destruction. The major problem with rigidly linked total elbow arthroplasty has been a high incidence of prosthetic loosening. Biomechanical analysis has shown that high moments tend to disrupt the osseous- methacrylate junction in the humeral medullary canal. Development of a semi constrained total elbow prosthesis transfers the developed stress to the collateral soft tissues and reduces prosthetic loosening to approximately 3 per cent. This is about one tenth of the incidence of loosening of the hinge type arthroplasty. This reduction in prosthetic loosening has been coupled with excellent gains in flexion and extension. However, improvement in forearm rotation has not been predictable, especially in elbows exhibiting preoperative fusion or fibrous ankylosis. Though the semi constrained total elbow has only been generally available for 3 years, a review of these results justifies its continued use for elbow reconstruction.

3671. An information source concerning disabled people. Disabled living foundation - Fanshawe E. - Disabled Living Found. Aids Cent., London ENG - AUST.FAM.PHYSICIAN 1976 5/10 (1418-1422)

Although the information contained in this article refers to a service based in the United Kingdom, it will be of interest to our readers nonetheless. There may well be a wide spread of equipment and services available to disabled persons in Australia, but it can readily be seen on reading this article that the only way to offer the best service to those in need, is to have a broadly based coordinating mechanism which can establish priorities, and aid distribution.

3672. Storage of elastic strain energy in muscle and other tissues - Alexander R.M. and Bennet Clark H.C. - Dept. Pure Appl. Zool., Univ. Leeds ENG - NATURE (Lond.) 1977 265/5590 (114-117)

Storage of strain energy in elastic materials has important roles in mammal running, insect jumping and insect flight. The elastic materials involved include muscle in every case, but only in insect flight is the proportion of the energy stored in the muscle substantial.

3673. A basic design of a chair for hemiplegics with special reference to the back shape - Batchelor K.W. and Farmelo G.P. - Dept. Exp. Pathol., Rheum. Res. Wing, Univ. Birmingham ENG - REHABILITATION (Lond.) 1976 No. 99 (23-35)

The seating requirements of hemiplegic patients are studied extensively in the light of ergonomic principles and with the co operation of the staffs and patients of 25 hospitals in the U.K. It is suggested that the provision of a suitable contoured back and seat shape would greatly reduce the need to use other supporting mechanisms in order to seat the patient comfortably and effectively. Plans are given for a chair which should provide integrated support for the patient while no constructional plans are given. The back shape is designed with the aid of data from a survey of elderly people's back shapes and it is hoped that this part of the design will find application in chairs for geriatrics as a whole. Before this, it is necessary to thoroughly test the design under working conditions.

3674. The effect of keypad angle of a table keyphone on keying performance - Cooper M.B. - PO Research Cent., Martlesham Heath, Ipswich, Suffolk ENG - APPL.ERGONOMICS 1976 7/4 (205-211)

Two keypad angle experiments, one numeral legibility experiment and one button tapping rate experiment are described. The effects of keypad angle on keyphone positioning, keying time, keying errors and on a keying performance measure are discussed. A geometrical method for estimating optimum keypad angle is introduced. It is concluded that the optimum angle for a keypad depends on its height above the desk surface. The geometrical method can be used to estimate the best angle in the absence of experimental evidence. For the experimental keyphone (keypad height about 90 mm) the best keypad angle was found to be about 25° to the horizontal, but the effect of a 10° deviation either way from this angle was quite small.

3675. Sensory control of leg movement in the stick insect Carausius morosus - Baessler U. - Fachber. Biol., Univ. Kaiserslautern GFR - BIOL.CYBERN. 1977 25/2 (61-72)

Hind legs with crossed receptor apodemes of the femoral chordotonal organ when making a step during walking often do not release the ground afte reaching the extreme posterior position. After putti a clamp on the trochanter (stimulation of the campaniform sensilla) the leg is no longer protracte during walking. However, during searching movements the same leg is moved very far forwards The anatomical situation of the campaniform sensil on the trochanter and the sensory innervation of th trochanter is described. After removal of the hair rows and continuously stimulating the hair plate at the thorax coxa joint the extreme anterior and posterior positions of the leg in walking are displa in the posterior direction. Front and middle legs operated in this way sometimes do not release the ground at the end of retraction. In searching movements the same leg is moved in a normal way. only the one side of a decerebrated animal goes ove a step, then on the other side a compensatory effe is observed. The main source of this compensatory information appears to be the BF1 hair plates. If th animal has to drag a weight the extreme anterior a posterior positions of the middle and hind legs are displaced in the anterior direction. Crossing the receptor apodeme of the femoral chordotonal orga when it causes the leg to remain in the protraction phase, displaces the extreme posterior position of t ipsilateral leg in front of the operated one in the posterior direction. Influences of different sources o the extreme posterior position can superimpose. A model is presented which combines both a central programme and peripheral sensory influence. The word 'programme' used here means that it does no only determine the motor output but also determin the reactions to particular afferences. The fact that the reaction to a stimulus depends on the internal state of the CNS is also represented by the model.

3676. Halo pelvic distraction apparatus: An analysis one hundred and fifty consecutive patients - Kalamc A., Yau A.C.M.C., O'Brien J.P. and Hodgson A.R. Dept. Orthop. Surg., Queen Mary Hosp., Univ. Ho Kong HOK - J.BONE JT SURG.SER.A. (Boston) 1976 58/8 (1119-1125)

One hundred and fifty consecutive patients on whom the halo pelvic apparatus was used were analyzed. Sixty six per cent had tuberculous kyphos or paralytic scoliosis. The apparatus was of great value in holding and correcting spines with tuberculous kyphosis and the results were gratifying even though the average correction of the kyphos w only 20 per cent. In paralytic scoliosis a 46 per cen correction was obtained, but presently Dwyer and Harrington instrumentation are used for the majori of such cases. The halo pelvic apparatus was effecti in holding and correcting severe congenital curves and kyphoscoliosis secondary to neurofibromatosis. especially when there were signs of cord compressio The complication rate was high early in the series, but has been lowered by strict patient selection and close adherence to specific guidelines in the application of the apparatus. The apparatus should be reserved for severe deformities when other mean of correction or stabilization are inadequate.

7. Electronic metronome for free running subjects - son P.G., Dearholt D. and Rohner L.C. - Dept. v. Med., Univ. Wisconsin, Madison, Wis. 53706 A - RES.QUART.AMER.ASS.HLTH YS.EDUC. 1976 47/3 (540-541)

his metronome unit provides a basic design roach which may be easily modified to achieve re specific requirements of frequency and dness. Loudness of signal may be increased by ucing R from 510Ω to 470 or 430Ω, with only a derate loss in power cell life.

8. A useful device for single fibre EMG jitter asurements the 'Jitter Bug' - Elmqvist D., lander M., Schiller H.H. and Svensson O. - Dept. n. Neurophysiol., Univ. Hosp., Lund SWE - ECTROENCEPH.CLIN.NEUROPHYSIOL. 1977 2 (264-266)

An electronic device containing filters, window gger and two sweep function generators is scribed. The device facilitates greatly the display d measurement of single fibre EMG jitter.

79. Experimental analysis of the loads acting on ow knee modular prostheses on outdoor walkway faces (Germ) - UNTERSUCHUNG DER LASTUNG VON UNTERSCHENKEL DHRSKELETTPROTHESEN AUF EHBAHNEN AUSSERHALB DES HAUSES - effens H.P., Engelke K.W. and Boenick U. - chgebiet Biomed. Techn., Inst. Feinwerktechn. omed. Technik, Berlin GFR - BIOMED.TECHN. 77 22/1-2 (8-12)

In order to reduce the dimensions of the weight aring parts, modular prostheses must be designed ing the principles of lightweight construction. This quires that sufficient data concerning the acting rces and moments are available for the design. ssential facts that influence the load are the velocity walking and the walkway surface. In order to aluate these influences some experiments on the ost frequent walking surfaces, asphalt, cobble stone, ubble and fine grain sand, were carried out at three fferent velocities. The results, which are discussed this paper, indicate, that the acting forces and oments are considerably higher than those easured on smooth surfaces, e.g. asphalt.

580. Orthomot OM2M; myoelectrical control and riving system for hand orthoses (Germ) - RTHOMOT OM2M; MYOELEKTRISCHES TEUER UND ANTRIEBSSYSTEM FUR IANDORTHESEN - Janovsky F. - Viennatone Ges. bH, Wien AUA - BIOMED.TECHN. 1977 22/1-2 1-26)

By way of introduction the author reports about ne experiments made with the myoelectrically ontrolled orthotic system Orthomot OM1 which has een in use for several years on paralysed patients ith lesions between C4 and C6. The knowledge btained therewith was the basis for the development f the new system ORTHOMOT OM2M. This system controlled by a combined impulse length and edge teepness control. An extremely light combined cog wheel and double spindle gearing operated by an electro motor is used as driving unit for the moveable finger part. The function of the complete system is described in principle as well as in detail using a functional diagram.

3681. A new motor control for electric wheelchairs (Germ) - EINE NEUE MOTOR STEUERUNG FUR ELEKTRO ROLLSTUHLE - Gersing E. - Lange Hecke 14, Gottingen/Klein Lengden GFR - BIOMED.TECHN. 1977 22/1-2 (27-30)

The construction of electric wheelchairs today must satisfy specific requirements in safety, durability in wear and reliability. A control system is described which was designed with these requirements in mind. The system consists of a pulse width modulation control of 2 DC motors which independently drive the wheels on each side.

3682. On head and body movements of flying flies - Geiger G. and Poggio T. - Max Planck Inst. Biol. Kybernet., Tubingen GFR - BIOL.CYBERN. 1977 25/3 (177-180)

Head and body movements of flies (Musca domestica and Calliphora erythrocephala) have been studied during sustained flight. Two main points emerge from the analysis: a) Changes in body direction and head direction occur simultaneously in almost all cases. b) During visually guided flight active neck movements are initiated together and in the same direction of body movements. This does not hold in absence of a visual pattern ('search'). Implications of these findings with respect to the organization of the control system underlying head body coordination in flies are briefly discussed.

3683. Point spread functions and optimum filters for position sensitive detectors that use pulse shape modulation and zero crossing demodulation - Nowlin C.H. - Oak Ridge Nat. Lab., Oak Ridge, Tenn. 37830 USA - REV.SCI.INSTRUM. 1976 47/6 (684-690)

To enable the later determination of nearly optimum, realizable position decoding filters for position sensitive detectors as well as to enable valid comparisons of various position sensitive detectors, we introduce in this work a productive, high quality approximation to the point spread function for position sensitive detectors that use pulse shape modulation and crossover time demodulation. This approximation is the result of a theoretical calculation and is determined as a general function of the input signal and rms noise at the input to each of the two crossover detectors. It is precisely applicable to position sensitive detectors that use any type of transmission line encoding. The effects of random variables, such as charge collection time, are included in the calculation, but the effects of correlated noise in the two channels are not included. In addition, for the broad class of position sensitive detectors that have electronic and thermal noise as the dominant causes of position uncertainty, general equations, based on our approximate point spread function, are given for the optimum filter impulse responses, the optimum pulse shapes at the inputs to the crossover detectors, and the associated minimum positional full width half maximum (FWHM). General equations are also given for positional FWHM of electronic noise limited detectors that use nonoptimum filters. Finally, for electronic noise limited detectors that use an RC transmission line encoder that is terminated in its characteristic impendance, a plot is given of the optimum pulse shape at the input to the crossover detectors.

6.14. Skin

3684. Thermometry of the surface of human skin. A study on a model using thermocouples, thermistors, thermovision and thermodyes - Flesch U., Wegener O.H., Scheffler A. and Ernst H. - Klin. Radiol., Klin. Steglitz, Freie Univ., Berlin GFR - PHYS.MED.BIOL. 1976 21/3 (422-428)

The temperature of the surface of a model of human skin is measured using a recently developed probe to house a thermocouple or thermistor. The results are compared with thermovision and thermodye measurements. The effect on skin temperature of hot and cold vessels at various depths is investigated.

6.15. Aerospace medicine

3685. Speech audiometry materials for air force use - Sutherland H.C. Jr. and Gasaway D.C. - USAF Sch. Aerospace Med., Aerospace Med. Div., Brooks A.F.B., San Antonio, Tex. 78235 USA - AEROMED.REV. 1976 No.2 (13p)

Speech audiometry materials are described that are recommended for use at special auditory test facilities throughout the U.S. Air Force. These materials were developed by Northwestern University personnel during several U.S. Air Force contract efforts. The test materials have proved to be convenient to use when assembled on magnetic tape in the order described and recommended. A description is given of articulation functions to be expected with both normal and sensorineural impaired subjects when the proposed materials are used.

3686. Changes in transthoracic electrical impedance at high altitude - Hoon R.S., Balasubramanian V., Tiwari S.C. et al. - Armed Forces Med. Serv., Min. Def., New Delhi IND - BRIT. HEART J. 1977 39/1 (61-66)

Mean transthoracic electrical impedance (impedance) which is inversely related to intrathoracic extravascular fluid volume was measured in 121 normal healthy volunteers at sea level and at 3658 metres altitude. Fifty (group A) reached the high altitude location after an hour's journey in a pressurised aircraft. Twentyfive (group D) underwent slow road ascent including acclimatisation en route. Thirty permanent residents (group B) and 16 temporary residents at high altitude (group C) were also studied. Serial studies in the 30 subjects of group A who developed symptoms of high altitude sickness showed a significant decrease ofimpedance up to the fourth day of exposure to high altitude which later returned to normal. The 4 volunteers who developed severe symptoms showed the largest drop in impedance. A case of acute pulmonary oedema developing at 4300 metres show an impedance value of 24.1 ohms on admission. Aft effective treatment the impedance increased by 11.9 to 36.0 ohms. Twenty asymptomatic subjects of gro A and 25 of group D showed a small average increa in impedance values at high altitude. These observations suggest that measurement of transthoracic electrical impedance may be a valuabl means of detecting incipient high altitude pulmonar oedema.

3687. Slide staining device for use during space fligh Brockett R.M., Brady J., Day J.L. et al. - L.B. Johnson Space Cent., Nat. Aeronaut. Space Adm., Houston, Tex. 77058 USA - APPL.ENVIRON.MICROBIOL. 1977 33/1 (203-2

A slide staining device is described that perform Gram and Wright stains during space flight. Reag and liquid wastes are contained within a closed system.

6.16. Work and sport

3688. Automatic compensation by capillary gauge fo altitude decompression - Mackay R.S. - Biol. Dept., Boston Univ., Boston, Mass. 02215 USA - UNDERSEA BIOMED.RES. 1976 3/4 (399-402)

According to simple theory, the indications of a capillary depth gauge are such that ascent rate and decompression stop position are correct to give unaltered gammas (tissue overpressures) and a safe dive profile, independent of the density of the medium or of surface altitude, if position indicatior are used directly in a standard decompression table The usual dial depth gauges must be doubly corrected for altitude but not medium before tables can be used, while distance measuring systems shou be corrected for both altitude and medium. The capillary gauge dive profile is theoretically conservative when timed step decompression rather than continuous ascent is used if γ increases with altitude.

6.17. Radiology

3689. Closed system ionography for diagnostic radiology - Fenster A. and Johns H.E. - Dept. Med. Biophys., Univ. Toronto CAN - MED.PHYS. 1976 3/6 (379-383)

Three methods are described whereby radiograph electrostatic images are transferred from inside of a liquid ionography chamber to the outside. One of these methods is implemented showing that multipl charge images can be transferred from a single original without significant degradation of image quality and each copy may be developed with a different amount of edge contrast. This new metho of imaging was applied to a radiograph of a test pattern and a hand phanton. An exposure of abou mR to the imaging chamber is needed to produce a ful image with a resolution of about 8 1p/mm.

0. In vivo measurements of lung corrections for fast tron therapy - Smith A.R., Jardine J.H., Raulson . et al. - Univ. Texas Syst. Cancer Cent., M.D. derson Hosp. Tum. Inst., Houston, Tex. 77025 A - MED.PHYS. 1976 3/6 (391-396)

ilicon diodes were inserted into the esophagus and nchus of anesthetized rhesus monkeys in order to asure the corrections to tumor dose resulting from rvening lung tissue during fast neutron therapy. derived corrections were applied to tumor doses patients being treated for cancer of the esophagus the fast neutron beam at TAMVEC. In vivo imetry performed on these patients using silicon des in the esophagus confirmed the accuracy of lung corrections. The measured dose and culated dose agreed to within 4% for four different ients. The magnitude of the correction is on the ler of 16% for the typical esophageal cancer ient. These studies were also done with Cobalt 60 order to test, against other data, the results ained with this animal model.

1. Cineangiographic measurements with the help of ertebral grid system - Wagner H.R., Teske D.W. Siu T.O. - Buffalo Child. Hosp., Buffalo, N.Y. A - CATHETER.CARDIOVASC.DIAGN. 1976 4 (353-359)

Cineangiographic measurements of cardiac uctures require knowledge of the magnification tor due to nonparallelity of the X ray beams. A w method is presented to determine the gnification factor from cineangiograms based on patient's height and the height of three vertebral dies and the adjacent intervertebral distances. The thod enables measurement of cardiovascular uctures from projected cineangiographic films ere the appropriate magnification factor is missing. rthermore, doubtful magnification factors can be ecked out as to their accuracy.

92. Recent experience in mammography using max rare earth system - Bruwer A. - Res. Ass., pt. Microbiol., Univ. Arizona, Tucson, Ariz. USA .CANAD.ASS.RADIOL. 1976 27/4 (283-285)

Comparison of two substantial series of mmograms has shown that reduction in exposure ne from about five seconds to about two seconds, other factors remaining equal, has made no fference in the true positive rate of diagnostic curacy. However, the amount of radiation to the east was reduced. Using rare earth screen and film mbinations allows a further dramatic reduction in e exposure time as well as in the kilovoltage and illi amperage without any apparent loss in quality. nce the amount of radiation is one important ctor, serious consideration must be given to the use rare earth screen and film combinations for ammography.

93. An automatic X ray exposure controller for ammography - Rose J.H. Jr. and Berdahl C.M. - ept. Radiol., Huntington Mem. Hosp., Pasadena, Calif. 91105 USA - RADIOLOGY 1977 122/1 (252-253)

A solid state sensor and associated electronic apparatus has been developed which automatically measures and controls film exposures when used with low energy diagnostic equipment. When the kilovoltage is held constant, exposure is determined by the quantity photons which reach the film, after passing through the breast. When the sensor is placed under the film, consistently good exposure density has been obtained. The design and installation of the sensor and exposure controller is presented.

3694. Tomosynthesis and coded aperture imaging: new approaches to three dimensional imaging in diagnostic radiography - Groh G. - Philips Forsch. Lab. Hamburg GmbH, Hamburg GFR - PROC.ROY.SOC.SER.B 1977 195/1119 (299-306)

Imaging with X radiation is one of the most important diagnostic methods in medicine. The present use of shadow projection results in the information on depth in three dimensional objects being lost. Structures in different depth are superimposed generating a confusing image which is difficult to interpret. These problems are partly solved by the well known method of tomography. It, however, generates only one layer, whose location in depth cannot exactly be settled beforehand, and is rather time and radiation dose consuming. These problems are overcome by tomosynthesis which utilizes a conventional tomographic equipment to record a set of radiographs each taken from a different position of the X ray source. Arbitrary layers of the X ray object can then be synthesized under visual control by reconstructing the projection geometry with holographic or electronic methods. Since about 3 s are required to record the individual radiographs, this method is still restricted to slowly moving parts of the human body. The recording time can be reduced to a few milliseconds by coded aperture imaging. It employs a small number of simultaneously operated, point like X ray sources to record a corresponding coded X ray image of the patient. Images of layers in deliberately chosen depth can then be generated by post processing. The paper will describe the theory and various optic and electronic systems for implenenting the algorithms involved. Experimental results will be demonstrated.

3695. Suppression of scattered radiation in radiography and improvement of resolution by spatially modulated intensity - Kowalski G. - Forsch.Lab., Phillips GmbH, Hamburg GFR - APPL.OPT. 1976 15/3 (648-655)

In radiography an object is examined by passing X rays from a point source through it to produce a shadowgraph picture. Ideally, the X ray photons should travel in straight lines from the source to the picture. However, scattering occurs within the object itself and so reduces the contrast of the picture. To suppress this scattered radiation a grating is inserted between the source and the object to modulate the object information. The scattered radiation remains almost unmodulated and does not vary as the grating is shifted. Decoding of the modulated picture with a second grating is described. An electronic demodulation method is also described. Detailed theory is given for a point source. Spatial resolution is shown to be enhanced.

3696. Biomedical and biological studies with infrared radiography - Veghte J.H., Adams W.C. and Bernauer E.N. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (417)

The use of infrared radiography in biomedical and biological studies has accelerated since Lawson's initial work in 1956. Until that time, military applications for visualization of this portion of the spectrum were classified, and few medical or environmental physiologists were aware of the potential use of this instrumentation. Lawson's work in detecting breast carcinomas using infrared equipment coincided with the concern of the medical profession and the public in the study of cancerous growths. During the next ten years, the use of infrared instrumentation gradually increased, and a number of potential clinical applications were explored. These earlier infrared radiographic studies have been reviewed in some detail. Since the time of that review, significant advances have been made in the instrumentation and applications. Clinically, the use of radiography or 'thermography' has peaked, but uses for this methodology are continually being explored with real time capability and finer resolution.

3697. An electronic patient contouring device - Doolittle A.M. Jr, Berman L.B., Vogel G. et al. - Dept. Therapeut. Radiol., Yale Univ., New Haven, Conn. 06510 USA - BRIT.J.RADIOL. 1977 50/590 (135-138)

The electronic patient contouring device is routinely used in our department for contours of patients who are to be treated in the prone or supine positions. Because the device cannot operate in the horizontal plane, contours of patients treated in upright positions continue to be made with plaster of Paris bandage. The device has proved to be of tremendous value when multi level contours and dose distributions are required. It has the virtues of being fast, accurate, convenient and reliable. However, in order to meet the requirements, it became relatively complex in terms of the task to be performed. It is not everyone's contouring device, and can be justified mainly for larger departments that treat more than 1000 new cases per year, and where comprehensive treatment planning is the rule rather than the exception.

3698. Noise reduction by radiographic magnification - Doi K. and Imhof H. - Cent. Radiol. Image Res., Univ. Chicago, Ill. USA - RADIOLOGY 1977 122/2 (479-487)

Effective noise in the rare earth system can be substantially reduced by use of radiographic magnification technique. The basic imaging properties of the rare earth system (Alpha 8 XM) and the medium speed system (Par RP) were evaluated by the Wiener spectra, modulation transfer functions, and H&D curves. The visibility of radiographic details was determined with simple test objects. Results indicate that, as the magnification increases, the effective noise in the rare earth system is reduced, and that the visibility of small structures can be improved.

3699. Initial performance of the Stanford medical pio generator - Pistenma D.A., Fessenden P., Boyd D.P et al. - Div. Radiat. Ther., Dept. Radiol., Stanford Univ. Sch. Med., Stanford, Calif. 94305 USA - RADIOLOGY 1977 122/2 (527-529)

A novel, cylindrical geometry, superconducting pion channel has been constructed at Stanford. It simultaneously deliver up to 60 radially converging pion beams of the same mean momentum but with individually variable momentum spread (0.0-4.3%) Virtually no tuning of the pion beam is required. Preliminary tests have demonstrated many of the performance characteristics which facilitate the treatment of selected human tumors.

3700. The problem of radiation dosage in the measurement of skin blood flow by xenon 133 - Patterson J. and Webster M.H.C. - Glasgow West Scotland Reg. Plast. Oral Surg. Unit, Canniesburn Hosp., Glasgow ENG - PHYS.MED.BIOL. 1977 22 (47-55)

The skin dose arising from the use of xenon 133 the measurement of skin blood flow has been calculated for several situations. The results indicat the importance of prior assessment of radiation do in any technique involving the use of radionuclides Cases where particular care must be taken have bee indicated and practical methods of reducing the do are suggested.

3701. Design for obtaining the half axial projection Kato W. and Wong M. - VA, Wadsworth Hosp. Cent., Los Angeles, Calif. 90073 USA - CATHETER.CARDIOVASC.DIAGN. 1976 2/4 (409-414)

A device for obtaining the half axial projection complementing single plane cine equipment is described. The design enables a single technician to raise and lower the patient's upper half of the bod between 0° and 20° of longitudinal deviation from t rotating cradle, set between 0° and 70° of horizonta deviation. Materials cost less than $100 and can be assembled by personnel in most hospitals.

3702. Radio interference from r.f. heating equipmen McLachlan A.S. - Direct. Radio Technol., Waterlo Bridge House, London ENG - RADIO ELECTRON.ENGINEER 1976 46/6 (267-275)

The incidence of complaints of r.f. interference from industrial, medical and scientific equipment i examined in the light of the acceptable limits set b international and national regulations. Some of the compromises which can be struck between the desirable and the practicable are illustrated by examples.

**3. Use of compressed air in a continuous flow
esthetic machine** - Garg O.P., Pande S.K., Shah
. et al. - Dept. Anaesth., SN Med. Coll., Jodhpur
D - BRIT.J.ANAESTH. 1977 49/1 (71-73)
nesthesia was given from a Boyle's apparatus to
patients, using compressed air as the carrier gas.
re are a number of reports of an increase in
apulmonary shunt in anesthetized patients who
athe air. This seems to be related more to the state
nesthesia than to the action of individual agents.
nn, Bergman and Coleman, have reported that
re is little difference in venous admixture when the
ired oxygen concentration is changed from 21 to
%. However, Pa(O_2) may still be reduced to an
cceptable value in patients with pre existing lung
ase and oxygen enrichment of the air is desirable
hese circumstances. Nevertheless, this technique
be a valuable addition to the armamentarium of
anesthetist in countries in which the supply of
sthetic gases cannot be assured.

**4. Fluidics and pneumatics: principles and
lications in anaesthesia** - Duffin J. - Dept.
aesth., Univ. Toronto CAN -
NAD.ANAESTH.SOC.J. 1977 24/1 (126-141)
This article describes the construction and
ration of fluidic and pneumatic devices in current
, as well as the principles of their use in medical
ices. The designs for an automatic blood pressure
f inflator, a blood pump and a high performance
tilator are presented.

)5. A ventilation monitor during demand flow CPAP
eadah M.W. and Seed R.F. - Dept. Anaesth.,
y's Hosp., London ENG - ANAESTHESIA 1977
/1 (41-45)
A commercially available pressure alarm monitor
been suitably modified to provide audible
rning of significant and critical changes in the
piratory patterns during demand flow spontaneous
tilation with CPAP. The alarm retains its
ginally intended function, i.e. detection of
ntilation failure during controlled or assisted
ntilation or both, with or without PEPP.

**06. A PSRO record keeping system for
esthesiologists** - Grogono A.W. and Kane P.B. -
pt. Anesthesiol., State Univ. New York, Upstate
ed. Cent., Syracuse, N.Y. 13210 USA -
NESTH.ANALG.CURR.RES. 1977 56/1 (16-21)
To meet the requirements for Professional
andards Review Organization (PSRO) auditing, a
w anesthesia record keeping system was designed.
e forms are also well adapted for use in an
esthesia teaching department.

**'07. Electric anaesthesia. A new device for
ectronarcosis (Ital)** - ANESTESIA ELETTRICA.
ARATTERISTICHE E FUNZIONAMENTO DI
N NUOVO APPARECCHIO PER
LETTRONARCOSI - Mangiameli S., Russo S.,
rimi G. et al. - Ist. Anestesiol. Rianim., Univ.
Catania ITA - MINERVA ANEST. 1976 42/12 (849-852)

A new electronic device for electronarcosis is described in detail as well as its characteristics and functioning.

3708. Some experiences with automatic acid base measurement in a department of anaesthesia - Jacobsen E. - Dept. Anaesth., Rigshosp., Univ. Copenhagen DEN - SCAND.J.CLIN.LAB.INVEST. 1977 37/sup.146 (41-44)

The ABL1 Acid Base Laboratory amply meets existing requirements for a blood gas measuring system that is easy to use by nonspecialist nursing staff. Without laboratory service and in next to no time it is capable of furnishing us with results that are sufficiently accurate for use in the clinic.

7. SURGICAL INSTRUMENTS

3709. An emergency tracheal cannula and alarm for the laryngectomee (Germ) - NOTFALL BEATMUNGSTUBUS FUR KANULENTRAGER; ALARMGERAT FUR LARYNGEKTOMIERTE - Matzker J. - HNO Klin., Stadt. Krankenanst. Koln GFR - H.N.O. (Berl.) 1976 24/11 (411-412)

An emergency tracheal cannula and a sound and light alarm for the laryngectomised patient are described. Both instruments, which are inexpensive and simple, were developed at patient request.

3710. A new sutureless technique for skin closure - Hasson H.M., Nicoloff D., Ford C.R. et al. - Dept. Obstet. Gynecol., Grant Hosp., Chicago, Ill. USA - ARCH.SURG. 1976 111/1 (83-84)

A sutureless wound closure device was used in 150 patients. The average time spent to effect skin closure was reduced; removal was easy; skin apposition was satisfactory; and patient response was favorable. Sutureless tape closures eliminate the disadvantages of invasive skin closures. The device described provides secure tape adhesion to the skin and does not cover the wound. It can be easily applied, adjusted, and removed, in addition to serving as a protective splint to the healing wound. This method can reduce operative time of skin closure with highly satisfactory cosmetic results.

3711. Endoscopic apparatus for vitreous surgery. Application to treatment for vitreous haemorrhage (Japanese) (Japa) - Amemiya T. and Harayama K. - Dept. Ophthalmol., Fac. Med., Kyoto Univ., Kyoto Shi JAP - ACTA SOC.OPHTHAL.JAP. 1976 80/11 (1565-1569)

Endoscopic apparatus for vitreous surgery was devised and made, and applied to treatment for artificially induced vitreous haemorrhage. The devised endoscopic apparatus houses the optical system, the lightning, the suction with cutting knife and infusion pipes in an oval tube of 5 x 3 mm diameters. The head of the endoscope can be bent forward and backward at the maximal angle of 60°. When this apparatus is inserted into the vitreous cavity through the incision at pars plana, any site in the intraocular cavity can be observed by this apparatus. A very clear view is obtained of the optic disk, retinal vessels, ora serrata, ciliary processes and posterior surface of the lens. After the blood obtained from the vein is injected into the vitreous cavity, the blood is removed by cutting, suction and infusion. The suction effect is most satisfactory. Although the vitreous surgery under observation through the pupil has been established, an endoscopic approach to vitreous surgery is another idea and may be effective.

3712. Recirculation of air in operating rooms - Ulrich J.A., Cribbs W. and Michaelsen G.S. - Univ. New Mexico Sch. Med., Albuquerque, N.M. 87131 USA - MED.INSTRUMENT 1976 10/6 (282-286)

A study of 2 neurosurgical operating rooms indicated a low, airborne, microbial population could be maintained by recirculating filtered air during surgical procedures. The commonly used turbulent system of air delivery was employed, and high efficiency filters were effective in removing airborne bacteria generated within the operating room. Optimal rates and percent of recirculation were determined. The method of exhaust was confirmed to be important. Exhaust ports 40 in. above the floor were more effective in maintaining low airborne microbial populations than baseboard level ports. The degree of activity of the surgical team and the number of personnel in the operating room correlated with the airborne bacterial counts.

9. COMPUTER APPLICATIONS

3713. CHRONOS: a data base management package for physicians and researchers - Goupy F., Hirel J.C., Bloch P. and Berger C. - Groupe INSERM U 88, Methodol. Informat. Statist. Med., UER Med. Pitie Salpetriere, Paris FRA - COMPUT.PROGR.BIOMED. (Amst.) 1976 6/3 (149-165)

This paper describes a general data base management package defined for medical applications. Chronos is a user oriented system which has been designed for physicians to get periodical reports and for researchers to prepare statistical treatments. The basic principles of the data base and program organization are described: many possibilities are offered for data acquisition and specific efforts have been made in order to analyze easily the evolution of patients. Several medical applications are now operational with Chronos in fields as different as psychiatry and nephrology.

3714. A data manager for the health information system Berlin - Appel K., Jainz M., Risch T. et al. - Min. Hlth Environm. Contr., Berlin GFR - COMPUT.PROGR.BIOMED. (Amst.) 1976 6/3 (166-170)

The needs for permanently changing the logical and physical structure of a medical data base during the development of a health information system have initiated the project of implementing a Data Manager. The concept of the Data Manager covers facilities for the development of the logical data structure model including documentation of the model and programming support for application programs accessing the health information system (HIS) data base. The outstanding facilities of the Interlisp system have been found to be appropriate for writing the Data Manager. A first data structure model, on which the Data Manager will operate, is roughly outlined.

3715. A data structure model for a health informatio system - Griesser G., Jainz M., Sauter K. and Schneider W. - Min. Hlth Environm. Contr., Berlin GFR - COMPUT.PROGR.BIOMED. (Amst.) 1976 6/3 (171-177)

The Ministry of Health and Environmental Con of Berlin is developing a Health Information Syste (HIS) on the basis of a multi satellite network syste comprising a central, regional, local and functional unit level. The main part of this paper describes the conceptual structure of the Common Date Base (CDB) of HIS with special regard to the patient oriented medical information originating from the various institutions of the health care system. This structure comprises the following five levels: patien problem, case, event, act. Each of the levels represents a node in the structure model. A node is an entity with a set of 'local properties' being specified for each level, referring to selected data on inferior levels. The structures of these five levels are described in detail. In the last part, so called 'data manipulation procedures' are treated. These are descriptions covering any data manipulation and represent the basis of data integrity through system controlled transactions with the data base.

3716. A questionnaire machine for collecting acciden data - Proctor T.D. - Safety Mines Res. Establishm Sheffield ENG - J.OCCUP.ACCIDENTS 1977 1/2 (113-122)

A description is given of a machine which has be designed to 'interview' people about accidents they suffered at work. This machine, developed from a commercially made 'teaching machine', displays questions on a screen; the accident victim responds by pressing numbered buttons. The information is obtained in a form which is easily decoded for analysis by computer. Preliminary trials with the prototype machine at a coal mine are reported and discussed.

9.1. Hospital automation

3717. LEARN: a computerized system for tumor nomenclature - Horton C.L. and Russell W.O. - C Horton and Ass., Computer Consultants Informat Sci., Houston, Tex. 77058 USA - INT.J.RADIAT.ONCOL.BIOL.PHYS. 1976 1/11-1 (1237-1244)

More than 2500 terms are used to describe the morphology and topography of neoplastic disease. For the past 25 years the Pathology Department of The University of Texas System Cancer Center, M Anderson Hospital and Tumor Institute, in collaborative interaction with the clinical staff, has lved these classifications of terms. Because lerstanding of the biological behavior of tumors is istantly being refined, the nomenclature of oplastic disease must have open ended flexibility handling evolving terms to quickly reflect new owledge and application. The computer ormation system developed to handle these terms, ARN, has allowed Logical Evaluation, Analysis l Reporting of the Nomenclature associated with topography and morphology of neoplastic disease. e LEARN system, computer adapted, is faster than nual methods of cross classification; it results in proved quality of reports, and it is versatile enough be used in handling terms in other medical fields. ARN also is available for use by other institutions ncerned with oncology and for translating the nenclature into other languages. The Anderson spital Nomenclature of Neoplastic Disease is one the products already created with the assistance of LEARN system.

9.1.1. Laboratory techniques

18. A semi automated specimen preparation system cytogenetics - AUTOMATION OF TOGENETICS. ASILOMAR WORKSHOP, CIFIC GROVE, CALIFORNIA - Melnyk J., rsinger G.W. II and Castleman K.R. - Bruce Mt ty Hope Med. Cent., Duarte, Calif. 91010 USA - WRENCE LIVERMORE LAB., U.CALIF. 1976 -67)

An improved semi automated system of slide paration for cytogenetics of mammalian cells has en developed which can process cells from ripheral blood cultures as well as from bone arrow and testes. The system is designed around a well culture tray and consists of a medium spenser, an aspirator, an hypotonic and fixative spenser and a slide preparation unit. The slide eparation unit has a slide dispenser which feeds 4 des to a location where fixed cells are dispensed. It so contains air dispersal and heating units, and a de stacking magazine. Processing specimens in ultiples of 12 has resulted in an overall reduction of me by a factor of 8. With this system it is possible r 2 technicians to process 576 specimens in an 8 our day. An advanced system is being developed hich will be operated by a computer to produce des of uniform quality. It will contain a specimen d slide identification system utilizing bar code bels to monitor the specimens throughout the rious stages of processing and analysis. The ecimen preparation system has been used for inical monitoring of chromosomes from newborns, ildren and adults and for monitoring of romosome breakage in mammalian cells from ood, bone marrow and testes.

719. The applications of the Coulter channelyser ries to haematology - Gibson J.M. EIR - IRISH IED.LAB.TECHNOL. 1977 9/1 (44-50)

Much of the research being performed on the latively new Channelyzer is at an early stage. Now e Teletype interface is available, more complex analysis can be made by off line computer systems. In the short time available the present workers have illustrated how much important information has been overlooked especially in the early diagnosis of anemia and in leukocyte size information related to the white cell differential. The speed and ease of data acquisition means more rapid diagnosis in routine hematology. The future of hematology is towards a computer opinion based on many facts of which the cell size distribution is shown to be a major contribution. Only by using the most accurate volume information available can the analysis be of greatest value, and the edit circuit of the current range of Channelyzers offers this.

3720. Estimation of protein ligand binding parameters from continuous ultrafiltration results - Steele J.A. and Durbin R.D. - Plant Dis. Resist. Res. Unit, ARS, USDA, Dept. Plant Pathol., Univ. Wisconsin, Madison, Wis. 53706 USA - COMPUT.PROGRAMS BIOMED. 1976 6/4 (238-242)

A method of analyzing the results of continuous ultrafiltration experiments to obtain protein ligand binding parameters is presented. This method employs a nonlinear least squares regression algorithm coupled with a model of protein ligand binding which allows the computation of free ligand concentrations, and a second order Runge Kutta method to integrate free concentrations with respect to collected ultrafiltrate. The approach is general and effectively removes the constraints on maximum fraction size imposed by other methods.

3721. Automatic treatment of assay data by competitive protein binding and radioimmunoassay - Martinez Alonso J.R., Zunzunegui Pastor V., Marin Rojas M.C. et al. - Fac. Med., Univ. Auton., Madrid SPA - COMPUT.PROGRAMS BIOMED. 1976 6/4 (249-262)

A method is devised for the automatic computation of data obtained from a series of determination by radioimmunoassay or by competitive protein binding. The input data is introduced by means of an automatic paper tape punch attached to the sample counter. A series of programs is set up for a Hewlett Packard computer, model 2116B with 16K, which calculates bound and free fractions with control processes for varying possible errors. From experimental data, by linear least squares regression, a standard curve of best fit is derived and is considered in three different ways. The curve of best fit is selected by comparing the correlation coefficients obtained by calculating the unknown sample concentrations. The program presents the results graphically together with a list of results which is for use within the Radiochemistry laboratory. Individual reports are also prepared for sending to those departments that requested the test.

3722. Simple methods for calculating reaction equilibria in single reaction or single moiety chemical networks - Park D.J.M. - Lab. Theoret. Biol., Nat. Cancer Inst., NIH, Bethesda, Med. 20014 USA - COMPUT.PROGRAMS BIOMED. 1976 6/4 (263-

268)

Smple procedures and programs for the HP 25 scientific calculator are given for solving mass action equilibrium problems in chemical networks which contain a single reaction or a single moiety.

3723. Computerized hematology. Operation of a high volume hematology laboratory - Drewinko B., Wallace B., Flores C. et al. - Dept. Lab. Med., Univ. Texas Syst. Cancer Cent., M.D. Anderson Hosp. Tum. Inst., Houston, Tex. 77030 USA - AMER.J.CLIN.PATH. 1977 67/1 (64-76)

Operation of automated hematology testing, on line to a laboratory dedicated computer, is described. The computer stores, retrieves and monitors the results of two Model S Sr. Coulter Counters, three Technicon platelet counters, one Electra 600 D, and six leukocyte differential consoles, which are interphased to the computer. All other hematology tests are batch entered via the keyboard of cathoderay tubes. The computer generates specimen labels, worksheets, and lists of incomplete tests, monitors all on line instruments, and performs all the calculations used in the procedures of quality control. Results are available instantaneously on cathod ray tubes strategically located in patient related areas throughout the institution. These can be obtained as all of the results for a given day or as cumulative summaries or histogram type plots of results for a given day.

3724. Data processing in clinical chemistry - Morgan L.M. - Dept. Clin. Chem., Belfast City Hosp., Belfast ENG - LAB.EQUIPM.DIG. 1976 14/6 (59,61)

In this article the author describes a simple system which has greatly improved the speed of reporting on a number of analytical techniques.

9.1.2. Administration

3725. A new blood administration set - Hood J.W. - Ryde Hosp., Sydney AUS - ANAESTH.INTENSIVE CARE 1976 4/4 (359-361)

A new blood administration set is described. It incorporates an in line hand pump and a heat exchange coil and has a number of advantages over separate heating coils. The blood warming efficiency of the unit has been measured.

9.2. Medical history

3726. Computer interviewing of patients with epilepsy - Chun R.W.M., Van Cura L.J., Spencer M. and Slack W.V. - Dept. Neurol., Cent. Hlth Sci., Univ. Wisconsin, Madison, Wis. 53706 USA - EPILEPSIA 1976 17/4 (371-375)

Epilepsy histories obtained by the computer interview were similar in substance and detail to histories recorded by house staff and attending physicians. In general, more information was obtained by the computer, and negative findings were consistently recorded by the computer. For potentially embarrassing questions, the computer may obtain a more accurate information (Slack and Van Cura 1968b). This might explain the contradictions concerning incontinence and medication. This preliminary study suggests that computer interviewi can provide a reliable method for obtaining epileps histories. The study also pointed out where changes in question wording and branching logic would improve the computer interview. These changes are being incorporated into the second version of the epilepsy interview. We hope computer based interviewing will prove useful to patients and physicians in the diagnosis, treatment, and study o epilepsy.

9.3. Clinical diagnosis

3727. A computer program for the generalized chi square analysis of categorical data using weighted lea squares (Gencat) - Landis J.R., Stanish W.M, Freeman J.L. and Koch G.G. - Dept. Biostatist., Univ. Michigan, Ann Arbor, Mich. 48109 USA - COMPUT.PROGRAMS BIOMED. 1976 6/4 (196-231)

GENCAT is a computer program which implements an extremely general methodology for t analysis of multivariate categorical data. This approach essentially involves the construction of tes statistics for hypotheses involving functions of the observed proportions which are directed at the relationships under investigation and the estimation of corresponding model parameters via weighted lea squares computations. Any compounded function the observed proportions which can be formulated a sequence of the following transformations of the data vector - linear, logarithmic, exponential, or the addition of a vector of constants - can be analyzed within this general framework. This algorithm produces minimum modified chi-square statistics which are obtained by partitioning the sums of squares as in ANOVA. The input data can be eithe (a) frequencies from a multidimensional contingenc table; (b) a vector of functions with its estimated covariance matrix; or (c) raw data in the form of integer-valued variables associated with each subjec The input format is completely flexible for the data as well as for the matrices.

3728. Parametric feature extraction through error minimization applied to medical diagnosis - Lissack and Fu K.S. - Sch.Engin., Tel Aviv Univ., Ramat Aviv ISR - IEEE TRANS.SYST.MAN CYBERN. 1976 6/9 (605-611)

Feature extraction for parametric problems is carried out via the direct minimization of the probability of error estimated by the F method. Th proposed methods for feature ordering and feature extraction are applied to the medical diagnosis of t cancer diseases (cancer of the pancreas and primar cancer of the liver) with encouraging results.

3729. A markovian decision model for clinical diagnosis and treatment applied to the respiratory system - Gheorghe A.V., Bali H.N. and Carson E.R Dept.Syst.Sci., City Univ., London ENG - IEEE TRANS.SYST.MAN CYBERN. 1976 6/9 (595-605) he complex process of medical diagnosis has litionally relied on the experience and judgment of clinician. With the increased application of tems ideas to medical problems in general, it is ely to consider their application to the diagnostic ation. Decision theory is well established, and eral decision models have been applied to medical blems. A unified approach to clinical decision king is presented. This approach combines tially observable Markov decision processes with se effect models as a probabilistic representation the diagnostic process. This new class of model has otential application to medical diagnosis and atment, and a respiratory system example is sented. The methodology is given for combining patient states of heath, the clinician's state of owledge of the cause effect representation from the servation space, and finally the treatment decisions h which to restore the patient to a more desirable te of health.

9.4.1. Electrocardiography

30. Computer analysis of the electrocardiogram - rtrand C.A. - Div. Cardiol., St Agnes Hosp., White ains, N.Y. USA - AMER.J.CARDIOL. 1976 38/3 4-395)

The results of the last 16 yr suggest that computer alysis of electrocardiograms is good for normal cings and less good for tracings the computer els abnormal. Without discussing sensitivity and ecificity, it is reasonable to state that, in the thors' experience, when a computer interprets an ctrocardiogram as normal it has a better than 95% obability of being correct, allowing for minor grees of S-T segment deviation; this figure is in reement with the data of Crevasse and Ariet. Since 68, the authors have performed more than 100,000 ultiphasic health testing examinations and in most bjects have recorded the electrocardiogram on tape r computer analysis. (Until July 1974, the authors ve used the Smith Hyde vector lead program and nce then, they have used the Bonner 12 lead ogram). In their experience, the computer tends to accurate in interpreting normal tracings, but has at ast a 1 in 3 chance of being partly or completely in ror about tracings it labels abnormal. Yet its rformance is better with some abnormal tracings. or example, when the computer interprets a left ntricular conduction disturbance or left bundle anch block, it is virtually always correct; in ntrast, there is greater variability with a right ntricular conduction disturbance or right bundle anch block. 2 Major limitations to computer use e implied in these considerations: first, the mputer's low level of reliability in interpreting normal tracings limits its clinical usefulness since, most hospitals, the majority of recorded ectrocardiograms are abnormal. Second, the lack of practical comparison program further limits routine inical use.

731. Influence of population on the classification of CG VCG's using linear regression techniques - Liedtke C.E., Greenberg W. and Tuna N. - Div. Hlth Computer Sci., Univ. Minnesota, Minneapolis, Minn. 55455 USA - INT.J.BIOMED.COMPUT. 1977 8/1 (35-44)

This paper describes the influence of different populations on statistical multivariate classification rules and classification results where the word 'population' refers only to the frequency of diagnoses to be expected, the so called prior probabilities. Using linear regression as a multivariate classification technique and six groups consisting of five pathological conditions and normals as test data, the following have been shown: That the population influences to a great extent the selection of the best ECG VCG measurements for the classification rule. That a mismatch of the populations in the learning and test sets can considerably decrease the number of correct classifications. And that a certain correction of the mismatch can be achieved when the prior probabilities in the learning and test sets are known. Further, the paper discusses the change of prior probabilities over the years at the Variety Club Heart Hospital in the University of Minnesota and its effect on the performance of the classification algorithm which has been used.

3732. A system for computer assisted ECG recording at rest and exercise - Jonson B., Werner O., Jansson L. et al. - Dept. Clin. Physiol., Univ. Lund SWE - SCAND.J.CLIN.LAB.INVEST. 1976 36/sup.145 (7-21)

Great investments have been made in computerized ECG interpretation but little attention has been paid to rationalization of such costly activities as recording, labelling and mounting ECGs, and still less to the presentation of ECGs. A system for such tasks is described. It includes a PDP8/E computer and modified ink jet ECG recorders, which write alphanumeric text and function as analogue input and output devices for the computer. On line computer service is given independently to two laboratories for ECG at rest, VCG or exercise ECG. After averaging the ECG signal, the computer writes out a properly labelled ECG in an easily surveyable form. The visual interpretation of the ECG is entered and is then written on a new sheet together with the averaged 12 lead ECG and a rhythm strip. In exercise testing, the computer records and processes the ECG at predetermined intervals. The processing includes an automatic ST classification. A summarized presentation of the ECG before, during and after exercise allows easy visual identification of ECG changes. Experience of the system has mainly been obtained from 2 years of routine exercise ECG recording and to a limited extent from ECG and VCG recording at rest.

3733. Experience of computer assisted ECG recording in 242 exercise tests - Werner O. - Dept. Clin. Physiol., Univ. Lund SWE - SCAND.J.CLIN.LAB.INVEST. 1976 36/sup.145 (23-29)

242 computer assisted exercise tests were studied. The computer performs simultaneous averaging of a 6

or 12 lead ECG, keeps track of the work load and time and labels all ECG records. Less than 1 per cent of atrial and ventricular extrasystoles were included in the computer average together with ordinary beats, while 80 per cent of all beats were averaged. Averaging reduced the peak to nadir QRS amplitude by 3-4 per cent at a sampling rate of 400/s and by 8-9 per cent at 200/s. Q waves with small beat to beat variation were usually well preserved after averaging while more variable QRS details often decreased in width or amplitude. The averaging program performed adequately on most kinds of arrhythmia. Averaging should not be used on pacemaker ECGs. Caution must be exercised in the presence of very frequent ventricular extrasystoles.

3734. Computer classification of ST and T in averaged ECGs at rest and exercise - Werner O., Johansson K. and Jonson B. - Dept. Clin. Physiol., Univ. Lund SWE - SCAND.J.CLIN.LAB.INVEST. 1976 36/sup.145 (31-43)

A computer program for ST and T classification at rest and exercise is described. The automatic ST classification was based on the modification of the Minnesota code suggested by Punsar et al. The T wave classification was based on the Minnesota code of 1968. Recordings at rest, during and after exercise from 217 exercise tests were visually classified by two observers, and their result was compared to the computer's. Computer observer comparisons yielded no more disagreements than between observer comparisons. There were computer observer disagreements caused by computer errors in 3% of the records. The repeatability of the computer's ST classification on records taken during exercise was better than that of one visual observer. Within computer and within observer repeatability appeared to be negatively affected by remaining noise in the average.

3735. The construction method of the QRS loop in myocardial infarction - Toyama S. and Suzuki K. - Dept. Cardiol., Cent. Adult Dis., Osaka JAP - ANNU.REP.CENTER ADULT DIS. 1975 15/1-2 (51-59)

In order to investigate the relation between the infarcted area in myocardial infarction and the change of the QRS loop, the following method was tried. The normal QRS loops in 3 planes were constructed with the digital computer. Then the vector of an optional segment corresponding to infarction was diminished and the QRS loops were constructed. Comparison of the QRS loops in clinical cases and in the construction method was made and the vectorcardiographic findings to estimate the infarcted area are discussed.

3736. The use of computers and adaptive statistical filtering to monitor electrocardiograms and detect premature ventricular contractions in heart beats - Bodenstein N.K. USA - IEEE TRANS.AEROSPACE ELECTRON.SYST. 1976 12/3 (417)

Measurements are taken on two features of the electrocardiogram: the R R interval and the QRS complex. The length of the R R interval is compar with the lengths of the four (4) previous normal R intervals. The (constant) value of the WALSH transform of the QRS complex (SORTV) is then compared to the 15 previous SORTV values. If significance is found for the t Test at the α = 0.00 level and the SORTV value is greater than at least t of the previous 15 normal SORTV values, the waveshape is classified as a Premature Ventricular Contraction (PVC). If only t Test significance is found, the waveshape is classified as an abnormal R interval, and a warning is given. In addition, if t SORTV value exceeds a threshold value 3 or mor times within a 15 second interval, a warning is give This procedure, which simulates real time, correcti identifies PVCs with a detection probability of 96 and a false alarm rate of 0.3%.

3737. Computer analysis of changes in Frank vectorcardiograms of 666 normal infants in the first hours of life - Guller B., Lau F.Y.K., Dunn R.A. et al. - Dept. Child Hlth. Developm., George Washington Univ. Med. Cent., Washington, D.C. USA - J.ELECTROCARDIOL. 1977 10/1 (19-26

Frank vectorcardiograms (VCGs) were collecte magnetic tape for 666 normal newborn infants at 1 12, 24, 36, 48, 60, and 72 hours after birth and analyzed by computers. The final total included 1. VCGs for white babies and 413 for blacks. No previous report has been made for the normal neonate with such a large sample, and no previous substantiation exists of possible age or sex differen at this early age. This study establishes a statistical significant change in vectorcardiographic patterns over the first three days, specifically in the measurements P duration, QRS duration, maximal spatial QRS amplitude, S in lead x, and T in lead as well as for several time normalized QRS vectors $\leqslant$ .005). Racial differences were significant for T waves in lead z. This study supports the use of vectorcardiographic standards sensitive to the age the newborn as well as to race.

3738. The use of a mini computer in an electrocardiology department (Fren) - APPLICATIONS D'UN MINI ORDINATEUR DANS UN DEPARTEMENT D'ELECTROCARDIOLOGIE - Fontaine G., Fran R., Coutte R. et al. - Serv. Cardiol., Hop. Salpetrie Paris FRA - ARCH.MAL.COEUR 1977 70/1 (39-

The wide potential of minicomputers and their versatility have modified the traditional image of t computer, allowing it to gain a real foothold in a cardiological service. Examples of some original programmes are: the automatic assessment of a pacemaker on the test bench, the formation of programmed impulses for electrocardiographic investigation, the analysis of arrhythmias by a histogram of the RR interval of frequency analysis the recording of isochrones in pericardial cartography.

3739. Recognition of atrial flutter by digital comput in routine ECG recordings - Plokker H.W.M., ıgeveld S.J. and Van Bemmel J.H. - Dept. diol., St Antonius Hosp., Utrecht NET - OGR.REP.MED.FYS.INST.TNO 1976 no.4 (164-)

method is described for the detection of atrial ter in the electrocardiogram by means of a digital ıputer. This method has been implemented in the ND module of the TNO Modular ECG/VCG ːrpretation System. The results obtained seem to w the conclusion that a satisfactory method has n developed.

9.4.2. Electroencephalography

0. Adaptive segmentation of EEG records: A new roach to automatic EEG analysis - Praetorius M., Bodenstein G. and Creutzfeldt O.D. - Abt. urobiol., Max Planck Inst. Biophys. Chem., ttingen GFR - ECTROENCEPH.CLIN.NEUROPHYSIOL. 1977 1 (84-94)

The first step in a procedure for automatic EEG ılysis is to compress the incoming data into a nageable format while preserving the essential gnostic information. In our approach we mimic visual procedure of looking through the record for ments and events of particular interest. We assume ıt the EEG is composed of roughly stationary ments of variable length, possibly superposed by ırp transients. By using an autoregressive model we ve developed a procedure to detect the segment undaries and locate transients, and to represent the ormation in the segments in terms of a set of rameters specifying their power spectra. In this y, the time structure as well as the frequency ntent of the signal is preserved. Examples of gmentation and transient detection are shown for veral EEG signals, and the quality of the presentation is demonstrated by simulating the iginal signal from the parameters. Possible plications to practical EEG analysis are discussed.

41. Parameter estimation of power spectra using aussian functions - Kingma Y.J., Pronk C.N.A. and arreboom D. - Dept. Med. Technol., Fac. Med., asmus Univ., Rotterdam NET - COMPUTERS OMED.RES. 1976 9/6 (591-599)

It is often necessary to compare power spectra, ch as those obtained from encephalographic cordings, with each other to discover trends or fferences. Spectra with a limited number of peaks ın, under certain circumstances, be considered as e sums of an equal number of Gaussian functions. he parameters of these functions can be obtained by eans of a simple procedure and they can be used to escribe and compare power spectra. The underlying ıeory of this procedure is given in this paper and me results are shown.

742. Period analysis of the electroencephalogram - ohen B.A. - Emory Univ. Reg. Rehab. Res. Train. ent., Cent. Rehab. Med., Atlanta, Ga. 30322 USA - OMPUT.PROGRAMS BIOMED. 1976 6/4 (269- 76)

A program is described which utilizes the Digital Equipment Corporation LINC 8 computer with 4 K of memory to process the electrical activity of the brain into a set of meaningful statistics. The program provides an efficient method of obtaining spectoral information concerning the EEG without the associated cost or complexity of conventional power spectrum techniques. The combination of utilization of a small laboratory computer with an easily programmable method provides an approach for automated EEG analysis which is within the financial and technical scope of most small hospital EEG laboratories.

3743. Automatic classification of EEG patterns using logic windows in the time domain (Japanese) (Japa) - Ueno S., Hasegawa R. and Harada K. - Dept. Electron., Fac. Engin., Kyushu Univ., Fukuoka JAP - JAP.J.MED.ELECTRON.BIOL.ENG. 1976 14/5 (379-386)

A new type of computer method for classifying aperiodic EEG waveforms is presented. The EEG waveforms are trapped into a time window with certain duration and threshold levels, and various activities are detected as to whether or not these activities coincide with the logic patterns stored in the memory of the computer. Continuous EEG records are digitalized at 100 samples per second into each group with a duration of 10.24 sec successively, and the zero level is determined by subtracting the average value of the 1024 sampled data. A time window of 3 sec width with threshold levels of ±50 μV and ±30 μV is passed along the time axis of the EEG time series, and the waveforms are coded into a series of 1, 0, -1 patterns comparing whether or not amplitudes exceed the threshold levels. To simplify this threshold pattern composed of 300 samples, codes that are consistently the same are condensed into a single code, and an adjunct window pattern is derived. Zero crossing patterns are also constructed. Paroxysmal activities are detected by the adjunct window patterns and information on the previous window. Stationary activities are classified by the sum total of 1 and -1 in the adjunct patterns and the number of zero crossings. In order to verify the feasibility of the method, typical EEG patterns during sleep in normal adults are filed and classified into several categories, and experimental tests are performed by an off line system.

9.5. Patient monitoring

3744. Three years' experience with computer based intensive care of patients following open heart and major vascular surgery - Robicsek F., Masters T.N., Reichertz P.L. et al. - Dept. Thorac. Cardiovasc. Surg., Charlotte Mem. Hosp., Charlotte, N.C. USA - SURGERY 1977 81/1 (12-21)

The authors present their experiences with the Roche 5000 Computer Based Intensive Care System in the management of 100 consecutive patients who have undergone open heart or major vascular surgery. The system performs the following functions: numerical and graphic display, out of limits alarms, storage and printout of 12 biological and surgical parameters, including chest drainage and urine output, by on line direct monitoring; display, storage, and printout of all additional laboratory and clinical data by manual input; automatic demand regulated transfusion and infusion program; a program of medical logic, which includes situation analysis based on the above, two way dialogue with the computer, treatment recommendations to the physician, selective nursing and laboratory orders, acid base analysis, and instructions for respirator setting. It was found that the computer monitored patients recovered faster and smoother, with fewer fluctuations in the measured parameters and fewer postoperative complications than did those treated by conventional methods. One additional important effect of the system was that the nurse, relieved of the mechanical tasks of measuring, charting, and recording, was left with a great amount of time for the care of the patient's personal needs. It seems ironic that such a technical advancement in electronics not only made the recovery faster and safer but also created a more humanistic approach in patient care through better application of basic nursing techniques.

3745. A remote monitoring system for nuclear reactors - Eder E. - Bayer. Landesamt Umweltschutz, Munchen GFR - KERNTECHN.ATOMPRAXIS 1977 19/1 (21-26)

The Department for Environment Protection of the State of Bavaria intends to build in Bavaria a remote monitoring system for nuclear reactors (KFU). The functions of the KFU will include a continuous computer controlled monitoring of radioactive emissions, of the meteorological parameters and of certain operating parameters of power reactors. In addition, the radioactive immissions in the vicinity of nuclear power plants will be determined by means of actual calculations. This will make it possible, in the event of an accident, to arrive rapidly at an evaluation of the conditions in the regions which might be at risk. The implementation of the first stage of the KFU is scheduled for completion by mid 1978.

3746. An interactive computerized ECG monitoring system: evaluation results - Swenne C.A., Duisterhout J.S. and Van Hemel N.M. - St Antonius Hosp., Utrecht NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (174-178)

An interactive computerized system for ECG monitoring is described. The system detects and classifies ventricular complexes. It provides alarms and surveys over the monitoring period. Therapy data can be registrated. The system was evaluated, using ECG recordings of 20 patients. From this evaluation data an error rate was computed. The outcome of the evaluation justifies the use of the system for further research on the prognostic significance of ventricular arrhythmias and in studies to assess the effects of pharmacological therapy.

3747. Detection of the abdominal foetal signal using a micro computer - Vennix H.W.A. and Van Der Weide H. NET - PROGR.REP.MED.FYS.INST.TNO 1 no.4 (179-184)

The state of the unborn child can be determine several parameters. One of the parameters that gi relevant information is the foetal heart rate. The foetal ECG is a weak signal in which the R waves often hardly detectable. A new method for foetal wave detection is described. This method is based running template matching. A heart rate meter, u a micro computer, is described.

9.6. Drug treatment

3748. Automated processing of data from pharmacokinetic investigations - Powers J.D., Pow T.E., Baggot J.D. et al. - Coll. Veter. Med., Ohio State Univ., Columbus, Ohio 43210 USA - COMPUTERS BIOMED.RES. 1976 9/6 (543-548

A program has been developed to evaluate plas levels of antibiotics, compute pharmacokinetic constants for a two compartment open model, the parameter estimates for a one compartment mode and the appropriate estimates for renal function determinations. The parameters estimated include volumes of ditribution, body clearance, K_{12}, K_{21}, K(el), and t(1/2) (half life) to name a few. In addition a summary table is included which tabul the individual subject estimates along with the me standard deviation, and standrad error for each statistic. The program is written in FORTRAN I requires 252 K of storage, and is currently being on the IBM 370.

3749. A computer based chemical information syst Chemical data stored in a central computer can be used internationally in real time and at low cost - Heller S.R., Milne G.W.A. and Feldmann R.J. - Managem. Informat. Data Syst. Div., Environm. Protect. Agency, Washington, D.C. 20460 USA - SCIENCE 1977 195/4275 (253-259)

Chemical data stored in a central computer car used internationally in real time and at low cost.

3750. Receptivity of physicians in a teaching hospi to a computerized drug interaction monitoring and reporting system - Morrell J., Podlone M. and Co S.N. - Div. Clin. Pharmacol., Stanford Univ. Sch. Med., Stanford, Calif. 94305 USA - MED.CARE 1977 15/1 (68-78)

Physicians at Stanford University Medical Cen were surveyed to evaluate their responses to a computerized drug interaction warning system on year after its installation. While one fourth of the respondents had personally received at least one warning report, the educational benefits of the sy had diffused to many physicians in the hospital. Reports were found to be useful for patient management and 44 per cent of the physicians w had received reports indicated they had changed behavior in response to the information. The syst was particularly beneficial for interns and medica students, and appears to have potential as an educational tool for training in therapeutics. Whil several problems with the system were noted, the all attitude of the respondents toward it was rable. The drug interaction warning system ears to have a promising future for reducing the blem of drug interactions among hospitalized ents.

7. Radiology

1. Electron beam treatment planning system - ne F. - Radiat. Therapy Dept., Dartmouth hcock Med. Cent., Hanover, N.H. 03755 USA - D.PHYS. 1976 3/1 (31-38)

ome of the physical parameters necessary in tron beam treatment planning are investigated for 45-MeV electrons extracted from a Brown Boveri atron. The percent depth ionization (PDI) curves compared with the empirical relation given by ghlin's equation, and an extension of Laughlin's ation is described. The modified absorption fficient (MAC) method is introduced to correct isodose distributions for the presence of omogeneities, such as lung, with the actual density ung and the location of the inhomogeneity taken consideration. Experimental data from asurements made in a water cork phantom are sented, and the results are compared with the ious calculated methods.

2. Principles of computer assisted tomography T) in radiographic and radioisotopic imaging - oks R.A. and Di Chiro G. - Sect. Neuroradiol., t. Inst. Neurol. Communicat. Disorders Stroke, hesda, Md. 20014 USA - PHYS.MED.BIOL. 1976 5 (689-732)

The ability to view a body section or layer clearly, hout interference from other regions, has long n a goal of medical radiology. This goal has now n achieved by a new technique known as constructive, or Computer Assisted Tomography. is development can best be appreciated by also nsidering earlier tomographic techniques.

53. On line computer system for the analysis of halometric radiographs - Chebib F.S., Cleall J.F. d Carpenter K.J. - Dept. Prev. Dent. Sci., Univ. anitoba, Winnipeg CAN - ANGLE RTHODONT. 1976 46/4 (305-311)

A simplified on line computer aided cephalometric alysis system has been presented. This will permit ndard cephalometric analyses to be made and can modified for individual operator's analysis. The stem would be useful in large practices or in stitutions where the hardware cost of approximately 0,000 could be justified. The system speeds and ndardizes a somewhat tedious orthodontic eration, but still demands that the orthodontist ake the important diagnostic decisions. The system most useful for universities but must, in the thors' minds, never replace the learning experience training and analyzing cephalometric radiographs anually, as it must always be remembered that diographic cephalometrics itself is only an aid to agnosis and provides us with some clinically useful, beit incomplete, information relating to craniofacial morphology.

3754. Computerized axial tomography in chronic seizure disorders of childhood - Bachman D.S., Hodges F.J. III. and Freeman J.M. - Div. Ped., Johns Hopkins Univ. Sch. Med., Baltimore, Md. USA - PEDIATRICS 1976 58/6 (828-832)

Ninety eight children with chronic seizure disorders were studied by computerized axial tomography (CAT). Structural abnormalities were identified in 30% of these children. The greatest incidence of abnormalities was in children with focal motor seizures (43%) and in those whose EEG demonstrated focal slowing together with focal spikes (38%). The most common abnormality was either focal or generalized atrophy (13%). Only about 2% of the abnormalities discovered by CAT were potentially of therapeutic significance. However, the demonstration of a static process, or the finding of a normal CAT, may be quite helpful to the family and physician in certain children with chronic seizure disorders.

3755. Epi and sub dural haematomas on computer tomograms (Germ) - DAS EPI UND SUBDURALE HAMATOM IM COMPUTERTOMOGRAMM - Lange S., Grumme Th., Meese W. and Zum Winkel K. - Strahlenklin., Freie Univ. Berlin GFR - FORTSCHR.RONTGENSTR. 1976 125/6 (537-540)

The computer tomographic investigation of two epidural and 26 subdural hematomas is described. Various computer tomographic signs are discussed and illustrated by some examples. Measurements of absorption values of subdural hematomas were related to in vitro experiments.

3756. Computed tomography in Maine: initial clinical experience - Tamm H.S. and Long J.M. - Dept. Neuroradiol., East. Maine Med. Cent., Bangor, Me. 04401 USA - J.MAINE MED.ASS. 1976 67/12 (360-363)

The first computed tomography unit in Maine was placed at the Eastern Maine Medical Center in December 1975. It is an EMI Head Scanner. The situation at EMMC is somewhat unusual in that the scanner unit is owned by a private corporation but placed in the hospital where acutely ill patients, those requiring anesthesia, and out patients may benefit. Furthermore, day to day supervision and interpretation of the examinations is shared jointly by several neurologists and a neuroradiologist. The purpose of this paper is not to present the situation as an ideal solution to various controversies, but to review the early results of the authors' experience, point out applicability and pitfalls, and compare their data with others.

3757. CT longitudinal scan - Haaga J.R., Alfidi R.J., MacIntyre W.J. et al. - Div. Radiol., Cleveland Clin. Found., Cleveland, Ohio 44106 USA - AMER.J.ROENTGENOL. 1976 127/6 (1059-1060)

One major problem with CT scanning has been the difficulty of relating the transverse CT images to the longitudinal axis of the body. This results in superfluous scanning during the typical examination.

For example, it is extremely difficult to accurately localize the area of the pancreas. To cover the pancreatic area, the patient is 'overscanned' with contiguous unrelated areas being covered. Moreover, this inefficiency consumes valuable table time with the scanner and adds a significant radiation cost to the patient. This factor is becoming more important with higher resolution and narrower collimated CT scans, both of which require higher radiation exposures. We propose a new type of longitudinal scan which will provide a partial solution. This has been accomplished with no modification of the existing hardware of the scanner but simply involves a software change.

3758. Computed tomography of the abdomen: initial experience - Petasnick J.P. and Clark J.W. - Dept. Radiol., Rush Presbyterian St. Luke's Med. Cent., Chicago, Ill. USA - GASTROINTEST.RADIOL. 1976 1/3 (201-208)

Computed tomography has provided a new dimension in the roentgenologic evaluation of the abdomen. Normal structures not visible on conventional examinations are clearly identified. Abnormalities are recognized by their alterations in anatomic form or by their effect on tissue absorption values. Our early experience suggests that in the abdomen computed tomography will be most valuable in detecting lesions in those sites least accessible to conventional roentgenographic methods such as the liver, spleen, pancreas and retroperitoneum.

3759. Computerized tomography using the EMI general purpose scanner - Kreel L. - Div. Radiol., Clin. Res. Cent., Harrow ENG - BRIT.J.RADIOL. 1977 50/589 (2-14)

The EMI General Purpose Scanner is briefly described, with particular reference to the use of window height and window width variations. Patient preparation in relation to movement artefacts and contrast medium is considered, and a method of localization of tomographic sections is described. The Scanner produces brain examinations of high quality. Because a head water bath is no longer required, the base of the skull can also be examined. In the thorax computerized tomography is particularly valuable in showing pleural disease in the forms of thickening, plaques or tumours, and in demonstrating retrosternal lymph node enlargement. Small peripheral metastases can be identified when not shown by conventional tomography. In the abdomen lymph node masses, retroperitoneal tumours and pancreatic disease has been identified, often more completely than by other methods, or where other methods have failed. This has proved particularly valuable in the grading of malignant disease and in the monitoring of subsequent treatment. It is particularly helpful in the planning of radiotherapy. Metastases in liver and bone can be clearly defined when still quite small (0.5x1 cm), but comparison with other methods of diagnosis such as grey scale ultrasound and isotope scanning will be needed before the role of computerized tomography in evaluating these lesions is known.

3760. The radiological diagnosis of meningiomas, t impact of EMI scanning - Claveria L.E., Sutton D and Tress B.M. - Radiol. Dept., Nat. Hosp. Nerv. Dis., London ENG - BRIT.J.RADIOL. 1977 50/5 (15-22)

A review of the impact of computerized axial tomography on the radiological diagnosis of meningiomas is presented. Seventy one intracrani and eight orbital cases have been examined by thi new method using the 160x160 matrix. The diagn accuracy of the method is compared with establis neuroradiological methods of examination (plain rays, angiographys pneumography and isotope scanning). The new non invasive method is undoubtedly the most accurate diagnostic tool ye available. It provided a specific diagnosis of meningioma in 77% of the intracranial cases with contrast enhancement and diagnosed the presence tumour in a further 19% giving an overall tumour diagnosis of 96%. There were three false negatives (4%). After intravenous injection of contrast med specific diagnosis of meningioma was made in a further six cases raising the specific diagnostic ra 86%. Specific identification of intra orbital meningiomas is more difficult though the presenc retro orbital tumour was correctly diagnosed in a eight cases examined (100%). In none of the auth cases was a false positive diagnosis of tumour ma However, there are areas where a specific diagnos meningioma can only be made as part of a wider differential diagnosis. Apart from the orbit these include the suprasellar area, the cerebello pontine angle, and the intraventricular regions. Occasiona also supratentorial gliomas or secondaries can simulate meningiomas.

3761. Radiology in the diagnosis of acoustic neuro ENG - CLIN.OTOLARYNGOL. 1976 1/3 (208-2

The greatly reduced mortality and morbidity associated with the neuro otological removal of s acoustic neuromas before there is evidence of intracranial extension emphasizes the importance early diagnosis. However, despite the greater awareness of an acoustic neuroma as the possible cause of unilateral deafness, and a whole range o new investigations, both audiological and neurological, few tumours confined to the interna auditory meatus are positively diagnosed and removed. The difficulty is mainly due to the vari presentation of the small tumour which may clos mimic more common conditions such as Meniere disease but also to the fact that no single clinica is positive in more than a proportion of cases. T definitive diagnosis is radiological but even so th a wide variety of radiological examinations inclu plain films, tomography, computerized tomograp isotope scanning, air and positive contrast cisternography as well as carotid and vertebral angiography that may be used. With the wider availability of computer axial tomography (CAT) suggested that the sequence of radiological investigation in cases of suspected acoustic neuro uld be as follows. Conventional tomograms or in films of the internal auditory meatus may be d as the initial screening procedure. Computer al tomography should be performed for those ients where a high degree of suspicion exists, and ; should detect tumors involving the ebellopontine angle. If the CAT scan is negative h a high degree of suspicion then Myodil ternography (preferably with a small volume of ıtrast media) should be used to demonstrate the all intracanicular tumour. Vertebral angiography l continue to have a subsidary role, particularly for nonstrating the course of the anterior inferior ebellar artery for the surgeon.

52. Automated diagnosis of congenital dislocation of hip - Endo M., Iinuma T.A., Umegaki Y. et al. - it. Inst. Radiol. Sci., Chiba shi JAP - ADIOLOGY 1977 122/1 (25-30)

A study of the automated diagnosis of luxatio xae congenita (LCC) was performed to establish an tomated screening system for hip radiographs. A ecific parameter with high diagnostic accuracy was ected by the use of information theory. Pattern cognition programs were written to extract the rameter from digitized hip radiographs. Parameter easurement was performed on 10 radiographs and mpared with manual measurements. Results owed good agreement with measurements obtained specialists. This study confirms the possibilities of itomated diagnosis of LCC.

63. Computed tomographic evaluation of increased tracranial pressure without localizing signs - eisberg L. and Nice C.N. - Dept. Radiol., Tulane ed. Sch., New Orleans, La. 70112 USA - ADIOLOGY 1977 122/1 (133-136)

A total of 29 alert patients with papilledema and o localizing neurological signs were evaluated by omputed tomography. Lesions were demonstrated in who exhibited ventricular enlargement or abnormal ssue density; 19 had normal ventricles which iggested pseudotumor cerebri and only 6 of these atients underwent subsequent neumoencephalography. In alert patients with apilledema alone, CT can demonstrate ventriculr bnormalities and abnormal densities, and assist in ne diagnosis of benign intracranial hypertension vithout pneumoencephalography or angiography.

764. The E.M.I. scanner - Hounsfield G.N. - EMI Cent. Res. Lab., Hayes ENG - ROC.ROY.SOC.SER.B 1977 195/1119 (281-289)

The EMI scanner is a machine which employs a ethod of Xraying patients whereby the information btained from the Xrays is fully utilized. The high ensitivity thus obtained enables the machine to ifferentiate between the various organs of the body hich are presented in 3 dimensional form as a series f tomographic slices. The machine scans through the atient in a transaxial plane with a narrow beam of Xrays. A bank of detectors measures the transmission hrough the body as it scans across the plane and this s repeated at many different angles through the plane. The readings obtained from the detectors are passed to a computer which mathematically reconstructs a picture of absorption values of the slice.

3765. Clinical experience with the E.M.I. scanner - Gawler J. - Nat. Hosp. Nerv. Dis., London ENG - PROC.ROY.SOC.SER.B 1977 195/1119 (291-297)

Computerized tomography of the head using the EMI scanner is a revolutionary method for diagnosing a wide spectrum of intracranial diseases. Because small differences in tissue density can be measured accurately the technique is sufficiently sensitive to demonstrate the ventricular system and major subarachnoid cistern. The cortical grey matter, basal ganglia and thalami can be distinguished from white matter. A 3 dimensional reconstruction of the brain is possible by examining a vertical sequence of transverse 'slices'. Dilatation of the ventricular system is readily seen and since cortical sulcal enlargement is also shown, a diagnosis of cerebral atrophy can be made. This removes the need for pneumoencephalography in the majority of patients presenting with presenile dementia. Many intracranial diseases can be recognized because they result in a detectable alteration in tissue density. Thus intracranial hematomas and certain tumors are of higher density than normal brain, while infarction, edema, abscesses and other tumors are of lower density. Any space occupying effect of a lesion may be simultaneously recognized by its effect on the ventricular system and subarachnoid cisterns. The gross morphology of many lesions can be identified; cyst formation in tumors or the presence of an abscess or tumor capsule for example. Such detailed information permits very accurate diagnosis, often more accurate than can be obtained from conventional neuroradiological investigations. Cerebral hemorrhage can be reliably distinguished from infarction and it is usually possible to distinguish tumors from the effects of cerebrovascular disease. All this is possible without risk or discomfort for the patient, who often avoids further radiological tests. Where it is available, the EMI scanner is dramatically changing the established investigative routine of patients suspected of intracranial disease. Computerized tomography must become the radiological investigation of 'first choice' in anyone suspected of intracranial tumor or abscess, and in patients with stroke, head injury, epilepsy or dementia.

3766. Computed tomography of the pancreas (Germ) - DIE COMPUTER TOMOGRAPHIE DES PANKREAS - Anacker H., Heller H.J., Rupp N. et al. - Inst. Rontgendiagn., Techn. Univ., Munchen GFR - DTSCH.MED.WSCHR. 1977 102/1 (3-5)

The computed tomography gives direct visualisation of the pancreas in a transverse section. Form, size, and changed consistency of the organ can be diagnosed. Being a non invasive technique it does not stress the patient, and can be applied to the severely ill with acute haemorrhagic pancreatitis. Other indications are chronic pancreatitis, pancreatic abscess, pseudo cyst and cancer. The differential diagnosis of cancer, especially from chronic pancreatitis, may be difficult. Further methods of investigation such as arteriography or endoscopic retrograde pancreatography may also have to be used.

3767. Detection of edema associated with myocardial ischemia by computerized tomography in isolated, arrested canine hearts - Powell W.J. Jr., Wittenberg J., Maturi R.A. et al. - Card. Unit, Massachusetts Gen. Hosp., Boston, Mass. 02114 USA - CIRCULATION 1977 55/1 (99-108)

This study was undertaken to determine if computerized tomography (CT scanning) with an EMI cranial scanner could detect edema associated with myocardial ischemia in canine hearts. A localized area of decreased density in the posterior papillary muscle and surrounding myocardium was detected on serial 8 mm CT scan slices of each heart after 60 min of circumflex artery occlusion and 45 min of reflow of blood. The wet/dry weight ratios and previous electron microscope studies of the ischemic posterior papillary muscles revealed edema accumulation. After 1 hour of arterial occlusion and 12 hours of reflow (which produces extensive necrosis and a decrease in the wet/dry ratio) lesions were still discernible but were less consistently as severe. Permanent ligation of the left anterior descending coronary artery and major collateral arteries for 6 hours also resulted in a lesion of decreased density in the distribution of the occluded arteries. Thus, CT scanning can detect, and is a potential means for sequential noninvasive quantitation of myocardial edema associated with ischemia.

3768. Processing of liver scan by an electronic computer: clinical experience - Machida K., Akaike A., Hayashi S. et al. - Dept. Radiol., Univ. Branch Hosp., Fac. Med., Univ. Tokyo JAP - NIPPON ACTA RADIOL. 1976 36/11 (1006-1015)

Liver scans were recorded in paper tapes simultaneously with routine scintigrams. By using these tapes the scintigrams were processed with TOSBAC 40 time sharing system computer. The liver scintiscans were recorded with a Toshiba scintiscanner (diameter 3 inches) with a 37 hole collimator (distance to focus, 10 cm), after i.v. administration of ^{99}Tc(m) or ^{198}Au colloid to the patient. The quality of images was compared among original photoscan, non smoothed digital computer display, and the smoothed digital display. By smoothing the original, the image of liver scans was improved markedly and appeared to be a more faithful expression of the radioisotope concentration in the liver, anatomically and physiologically. The computer displayed each point in 10 different marks according to the number of counts, which enabled quantitative recognition of the radioactivity of the point. 13 point smoothing, 5 and 9 point smoothing were performed. In detecting the filling defect it is concluded that the incongruity of the concentration of a radioisotope is an important factor and the contour scan could play a role in making diagnosis. Further, the integral counts of the liver as well as splenic area were calculated, and the ratio between these 2 counts was compared. The ratio of each lev of the count between liver and spleen was also calculated.

3769. Abnormal CT scans in migraine - Mathew N. Meyer J.S., Welch K.M.A. and Neblett C.R. - Houston Headache Clin., Houston, Tex. 77004 US HEADACHE 1977 16/6 (272-279)

Twenty nine patients with migraine were examin by CT scans. Ten of these had abnormalities on th scans which consisted of cerebral parenchymal low densitometric areas, ventricular enlargements and cortical atrophy. The cerebral parenchymal low densitometer zones tended to disappear on repeat scanning. Four cases in the series had hemiparetic migraine and all showed abnormalities on CT scan The incidence of complicated migraine was highe patients who showed abnormalities on the scan tha in those with normal scans. It is suggested that the parenchymal low density areas on CT scans are th result of cerebral edema, but that repeated insults might lead to permanent changes in brain parenchyma which might be recognizable as cortica atrophy and ventricular enlargement.

3770. A real time system for multi image gated card studies - Bacharach S.L., Green M.V., Borer J.S. et - NIH, Bethesda, Md. 20014 USA - J.NUCL.MED 1977 18/1 (79-84)

A minicomputer based system is described that allows real time construction and simultaneous display, in flicker free movie format, of a cardiac cycle spanning sequence of ECG gated scintigraph images. In as little as 2 min, the endless loop flicke free movie clearly displays cardiac anatomy, time dependent volume variations of cardiac chambers, and abnormalities of cardiac wall motion that wou be difficult or impossible to detect from static gate images. Simultaneously, a time activity curve with high temporal resolution can be generated from a previously defined region of interest, thereby quantifying additional parameters of cardiac functi Because the movie and time activity curve are displayed in real time and require only a short dat collection interval to achieve statistical reliability, physician can use the system interactively, modifyi the form, intensity, or duration of diagnostic and therapeutic interventions based on the observed response. This system is well suited for interventio studies, for continuous cardiac monitoring, and for the rapid screening of patients with suspected card disease.

3771. An improved FORTRAN program for calculating modulation transfer functions: concise communication - Benedetto A.R. and Nusynowitz M.L. - William Beaumont Army Med. Cent., El P Tex. USA - J.NUCL.MED. 1977 18/1 (85-86)

An improved Fortran II program for calculating modulation transfer functions (MTFs) is presented The program features simplified input-data specifications; a conversational mode of use; and hic printout of the MTF curve.

2. Roentgen diagnosis of the ophthalmological field ACTA SCANNER (Japanese) (Japa) - Takao M. Totsuka K. - Kanto Teishin Hosp., Tokyo JAP - TA SOC.OPHTHAL.JAP. 1976 80/10 (1081-1089)

Ve made efforts to produce good scan images by first imported ACTA SCANNER in Japan. A ht change in positioning of the skull causes iculty in finding the correct diagnosis of eye eases. Initially we took a transverse X ray otograph, and then on that film decide several portant points, such as the angle between Reid's and the line which connect the center of the nea and of the apex of processus clinoideus erior, plus the length of the perpendicular line m the center of the cornea to the Reid's line. cording to data and using the scale that we gested, we fix the position of the patient's head d do the scanning. Even taking much care of the ndard mechanism of this apparatus, it is difficult get an equal image of both orbits. The diagnosis of ophthalmological field by the ACTA SCANNER ust be performed with minute care compared with usual examination of the optic canal.

73. Computerized tomography with A scan ography in detection of orbital disorders eliminary report) (Japanese) (Japa) - Sawada A. d Cornell S.H. - Dept. Ophthalmol., Med. Coll. yazaki JAP - ACTA SOC.OPHTHAL.JAP. 1976 /10 (1090-1096)

Computerized tomography was compared with A n echography in detecting orbital disorders in 34 ablished or suspected cases in University of Iowa ospitals and Clinics, Iowa City. In computerized mography using EMI scanner equipped with the e 160 x 160 matrix and the 8 mm sections, positive ndings could be demonstrated in 23 (67.6%) of the tal 34 cases in 8 (72.7%) of the pathologically rified 11 cases. On the other hand, A scan hography using the optimized and standardized retztechnik 7200 MA could detect orbital disorders ore effectively, namely, in 31 (91.2%) in the total 34 ses and in all the pathologically verified cases. The efulness in differential diagnosis will be discussed the future. Factors inhibiting the resolution of bital disorders in computerized tomography were nsidered. They would be positioning and fixation the head, section thickness as well as size, border, cation of the lesion, deviation of the optic nerve om the sliced. The most important thing in creasing the efficiency of computerized tomography to check the findings in each scanning and repeat e examination immediately, if necessary.

774. Aspects and evolution of cerebrovascular ccidents (Fren) - ACCIDENTS VASCULAIRES EREBRAUX, ASPECTS EVOLUTIFS - Caille M., Constant P., Dop A. et al. - Serv. Neuroradiol., ent. Jean Abadie, Bordeaux FRA - NEURORADIOL. 1976 3/4 (297-312)

Seventy two patients presenting clinical findings of erebro vascular accidents were studied by computed tomography. With 50 patients who had suffered acute ischemic attacks, the evolution of the infarction was followed up in 71 examinations. Difficulties of diagnosis within the first fortnight are discussed. Twenty two patients presented a clinical picture of meningeal or cerebro meningeal haemorrhage. Eighteen haematomas were diagnosed and their evolution was followed in 31 examinations.

3775. Computerised axial tomography in non tumourous conditions (Fren) - LA TOMOGRAPHIE AXIALE AVEC ORDINATEUR DANS LES MALADIES NON TUMORALES - Ruggiero G. and Sabattini L. - Serv. Neuroradiol., Hop. Bellaria, Bologna ITA - J.NEURORADIOL. 1976 3/4 (313-330)

The work concerns the use of CT in non tumorous neurological diseases, i.e. temporal lobe epilepsy, epileptogenic encephalopathy, malformations, hydrocephalus.

3776. Acta scanner and neuroradiology (Fren) - ACTA SCANNER ET NEURORADIOLOGIE - Caille J.M. - Serv. Neuroradiol., Cent. Jean Abadie, Bordeaux FRA - J.NEURORADIOL. 1976 3/4 (331-334)

It is very difficult to compare the performance of machines which have not investigated the same patient at the same time. However at the moment it seems that the diagnostic effectiveness of the different machines is very comparable, if not identical. In this light, the 'total body' scanner seems to present more advantages than disadvantages for the investigation of the head. The new generation machines will probably bring useful improvements: rapid rotation, improved density resolution, 3 dimensional reconstruction of images, simulation of radiotherapy, etc.

3777. The future of computerised axial tomography (Fren) - AVENIR DE LA TOMOGRAPHIE AXIALE AVEC ORDINATEUR - Bull J.W.D. - Springhalls Park Corner, Netthebed, Henley on Thames ENG - J.NEURORADIOL. 1976 3/4 (335-338)

Hounsfield and Ambrose demonstrated that a mass in the brain could be differentiated from normal brain tissue. An enormous variety of pathologic lesions have been resolved by this method. The greatest benefit of this method is its complete safety for the patient. The combined information obtainable fron an enhanced C.A.T. examination and an isotope scan has not been fully exploited. There is no doubt that C.A.T. will greatly change the pattern of handling neurological problems.

3778. A simple computer program for optimization of source loading in cervical intracavitary applicators - Rosenstein L.M. - Dept. Med. Phys., Mem. Sloan Kettering Cancer Cent., New York, N.Y. 10021 USA - BRIT.J.RADIOL. 1977 50/590 (119-122)

A computer program has been developed to aid in the brachytherapy of cancer of the cervix. Using a least squares minimization algorithm, the program will optimize the source loading in intracavitary applicators so as to reproduce, as nearly as physical considerations allow, the dose distribution requested by the user. Applicator geometry and the relative positions of anatomical points of interest must be supplied to the program, as well as an inventory of available source strengths. Output from the computer includes the optimized source loading, time of application, and the resulting relative doses to the various user selected points of interest.

3779. A new method of X ray imaging: computed tomography (Japanese) (Japa) - Endo M. and Umegaki Y. - Div. Clin. Res., Nat. Inst. Radiol. Scis, Chiba JAP - JAP.J.MED.ELECTRON.BIOL.ENG. 1976 14/5 (369-378)

Computed Tomography (CT), a new method of medical X ray imaging has become the center of wide interest in clinical medicine and it is about to be generally used in Japan. The technical background, the principle, present status and future prospect of this technique are described with some explanations of reconstruction algorithms. The technical background of CT consists of X ray transverse tomography, RI imaging devices with on line data acquisition system and algorithms of 3 D reconstruction from projections. A CT Scanner is a kind of apparatus which makes the transverse tomograph, but is different from conventional ones in principle. The features of this apparatus are that: it uses a narrow beam of X ray. The radiation detector is a scintillation counter. It reconstructs distribution of absorption coefficients in the cross section from intensities of transmitted X ray. The CT Scanner can show variations of absorption coefficients in the soft tissues. EMI's brain scanner is described as an example of the first generation scanners. New types of CT Scanners, which are more rapid in scanning speeds and finer in resolutions, are also described. Among them, Dynamic Scanner produced by JEOL is promising because it scans X ray not mechanically but electro optically. In the future, one may develop a dynamic CT Scanner by the use of an electro optical scan. Algorithms of 3 D reconstruction from projections are explained in relation to CT. Iterative methods, Fourier transform methods and convolution methods are mentioned. For the parallel beam geometry, convolution methods are the best of all algorithms. But, for the fan beam geometry, many methods are being studied in order to obtain the optimum one.

3780. Computed tomography: in vitro evaluation of myocardial infarction - Gray W.R. Jr., Parkey R.W., Buja L.M. et al. - Dept. Radiol., Univ. Texas Hlth Sci. Cent., Dallas, Tex. 75235 USA - RADIOLOGY 1977 122/2 (511-513)

An in vitro study of computed tomographic (CT) scanning of experimental myocardial infarction (MI) was performed by studying isolated canine hearts 18 to 48 hr post infarction. CT scanning does not detect histologically present calcification in the area of an MI, but can be used to identify wall thickness changes in these areas. Decreased attenuation coefficients are found in infarcted myocardium where thinning is present. The potential of CT scanning t detect areas of MI is confirmed.

3781. Evaluation of brain and epidural abscesses by computed tomography - Lott T., El Gammal T., Dasilva R. et al. - Dept. Radiol., Univ. Hosp., Augusta, Ga. USA - RADIOLOGY 1977 122/2 (3 376)

Most brain abscesses have a characteristic but nonspecific appearance on computed tomography (CT), consisting of a ring configuration of the abs capsule which shows marked enhancement after injection of contrast material. CT scanning is invaluable in both the initial investigation of a bra abscess and assessment of its response to therapy The CT scan showed a peripheral low density crescent in one case of epidural abscess.

3782. Use of a generalized modular data handling system in nuclear medicine - Holden J.E., Nickles R.J., Kiuru A. and Polcyn R.E. - Sect. Med. Phys. Dept. Radiol., Univ. Wisconsin, Madison, Wisc. - RADIOLOGY 1977 122/2 (411-416)

Addition of a CAMAC modular data handling system to a small computer used for gamma came work has allowed the acquisition and processing o broad variety of nuclear medicine data. Significan contributions have been made ranging from clinic renal evaluation to radiopharmaceutical developm Digital rectilinear scanning and computer acquisit of physiological signals such as the electrocardiog are other applications. The system provides an inexpensive means of matching present day nucle computers to the diversity of data.

3783. Computer tomography in the diagnosis of epilepsy (Germ) - DIE COMPUTER TOMOGRAPHIE IN DER DIAGNOSTIK DER EPILEPSIE - Van Gall M., Becker H. and Hacker - Zent. Radiol., Johann Wolfgang Goethe Univ., Frankfurt/M. GFR - NERVENARZT 1977 48/2 76)

250 patients, most of whom were undergoing th first search for the cause of their disorder were examined by computer tomography. There was a slight excess of pathological over normal findings (54% as against 46%). Numerically the most prominent were atrophic changes, followed by spa occupying changes, zones of oedema, calcification and considerable porencephalic defect formations the possible etiological basis of the attacks. Typic examples show up in the image from time to time that those cases that are described as 'genuine' fa in number, in consequence of this and all other modern diagnostic methods, to about 20%. The significance of computer tomography in further neuropsychiatric illnesses is emphasized, especiall from the point of view of studies of the course.

3784. Quantitative coronary arteriography. Estimat of dimensions, hemodynamic resistance, and atherc mass of coronary artery lesions using the arteriogr and digital computation - Brown B.G., Bolson E., Frimer M. and Dodge H.T. - Cardiol. Div., Univ.

shington Sch. Med., Seattle, Wash. 98195 USA - RCULATION 1977 55/2 (329-337)

ore accurate characterization of coronary artery ions is needed for evaluation of short and long n intervention in coronary disease. A method of mental artery analysis has been developed to ximize the information obtained from coronary eriograms. Coronary lesions are traced from two jected, perpendicular, 35 mm cineangiographic ws and transmitted, in digital form, to a PDP 45 computer. Magnification and distortion of the ige are compensated for in order to determine the ual vessel profiles, using the catheter and its ation as a scaling device. The two views are tched; a spatial representation of the vessel nterline is reconstructed mathematically; and hogonal vessel diameters are computed at rements along this centerline. Assuming an ptical lumen, the absolute and percentage luction in diameter and cross sectional area in the nosis are computed. More complex functions tegrated atheroma mass, Poiseuille resistance, and fice resistance) are then calculated. The accuracy d variability of the different steps involved in ion analysis have been determined. Dimensional curacies of ± 150 microns (SD) are feasible. amples are given of patients with Prinzmetal's gina and with progressive coronary disease.

85. Computer system for clinical nuclear medicine erm) - ELEKTRONISCHE ATENVERARBEITUNG IN DER KLINISCHEN UKLEARMEDIZIN - Knopp R. - Inst. Klin. Exp. ukl. Med., Univ. Bonn GFR - FORTSCHR.MED. 77 95/7 (416-420)

Computer techniques as introduced into clinical iclear medicine 12 yr ago, were first exclusively ed for scintigraphic purposes. Through the evelopment of a comprehensive pilot system for iclear medical data processing on the basis of two emens Process control computers, it could be emonstrated that besides scintigraphy there are also her important fields for computer application, e.g., function diagnostics and therapy planning.

9.10. Function tests and techniques

786. A technique for joint center analysis using a tored program calculator - Dimnet J., Carret J.P., onon G. and Fischer L.P. - Lab. Anat., Fac. Med., yon FRA - J.BIOMECH. 1976 9/12 (771-778)

For a long time in the study of joint kinematics, he instant center of rotation in plane motion was btained through graphic drawings. Since then the tudy of joint kinematics has become three limensional involving the use of computers. A stored rogram calculator was used as it is a precise nstrument and several films can be used even if their ositions are very close to one another. A movement s never perfectly plane, it was important to define a oefficient (in percentage) to qualify the more or less lane character of a movement. An analytical ocation is a better way than using graphic drawings f I.C.R.: to smooth the raw coordinates; to calculate the plane motion coefficient in order to eliminate an X Ray picture of a whole series of pictures for lack of a plane character; to define in the results an error rectangle whose dimensions are linked to errors in the observation and then to pick out among the points of a body those with the smallest risk for error. To probe this method the two radio ulnaris joints were studied. At present studies are being carried on to compare the I.C.R.'s behaviour of the lumbar spine during a motion of lateral inflexion both in the case of normal people and people with scoliosis.

9.10.1. Blood circulation

3787. Application of time derivative curves in the evaluation of time dependent physiological functions - Borgnis F. and Dvorak T. - Inst. High Frequency Electron., Fed. Inst. Technol., Zurich SWI - ACTA CHIR.SCAND. 1976 142/Sup 465 (55-59)

Registration of the basic photo electric pulse curve together with the synchronized first and second time derivative curves has been shown to be useful in the interpretation of the waveform. At the same time it improves the measurement of the basic curve parameters. An extension of the zero crossing technique permits the digital measurement of the traditional parameters as well as of the positive to negative crest ratios. Such a ratio is independent of the amplitude of the original pulse.

3788. Data display records for patients with cardiac pacing - Levander Lindgren M. - Pacemaker Unit, Dept. Med., Karolinska Sjukh., Stockholm SWE - ACTA MED.SCAND. 1976 200/SUP.596 (77-79)

When the Pacemaker Unit at Karolinska sjukhuset started 3 yeras ago, one was in the double sense of the word, weighted down by vast and unsurveyable records. The Unit acts as a centre for 450 patients, and the Out patient Department has about 3,000 visits a year. One sought a record system which could achieve the following goals: 1. Complete and comprehensive records. 2. A surveyable presentation. 3. Ready access to the information. 4. Facility for research. 5. Easy handling and learning. The proximity to the Thoracic Surgical Clinic, where a real time patient data system was already functioning permitted us to be linked to the same computer. Such a patient data system, with the information immediately accessable on data display sets, seemed to fulfill all the goals set forth. The data display records would replace the conventional records in the Out patient Department and summarize the conventional records of the hospital wards.

3789. Real time method for noninvasive recording of His bundle activity of the electrocardiogram - Van Den Akker T.J., Ros H.H., Goovaerts H.G. and Schneider H. - Dept. Med. Phys., Free Univ., Amsterdam NET - COMPUTERS BIOMED.RES. 1976 9/6 (559-569)

A new method has been developed for on line noninvasive recording of the electrical activity within the P R segment of the electrocardiogram (ECG). The electrocardiogram is obtained using a bipolar chestwall lead. After amplication the signal is processed by a minicomputer. The signal to noise ratio of the signal is improved using the averaged response technique. Special care was taken to facilitate on line man machine communications. The user can monitor the averaging process with the aid of a point plot display of the data and a set of switches. The method was tested by comparing intracardiac electrograms of 10 patients with their own surface recorded ECG's. This simplified and fast method gives the user information about conduction abnormalities in a noninvasive way. The method is evaluated in the clinic.

3790. Automatic processing of systolic time intervals - Donders J.J.H. and Snoeck B. NET - PROGR.REP.MED.FYS.INST.TNO 1976 no.4 (48-55)

Two components of an automatic processing system to determine Systolic Time Intervals are described: the preprocessing unit and a digital computer signal processing system. The functions of the preprocessing unit include isolation for patient safety, filtering, automatic gain control and generation of coding signals. All signals are stored on magnetic tape for off line processing. The computer system is modular in structure, based on the subdivision of the processing system into several independent tasks. The main modules are described briefly and some principles of the signal processing are outlined.

9.10.2. Respiratory system

3791. A digital computer and a lung function test service: Efficiency and costs - Derrett C.J., Jones D.P., Collins J.V. and Wells F.M. - St Bartholomew's Hosp., London ENG - BRIT.J.DIS.CHEST 1977 71/1 (60-62)

An off line digital computer used to calculate the results of routine lung function tests saved an average of 20% (9.8 min) of the time required per patient when compared with the use of a simple electronic calculator. This saving would permit an increase in the work load of the laboratory from 1250 to 1500 patients per year if the same tests were used. The cost of suitable computer equipment, however, would exceed that of employing an additional lung function technician.

3792. A computerized approach to closing volume determination - Cramer W.O. and Miller W.C. - Pulmonary Div., Dept. Int. Med., Univ. Texas Med. Sch., Houston, Tex. 77025 USA - ANN.ALLERGY 1977 38/1 (22-26)

A computer program was designed to analyze the single breath nitrogen curve and calculate closing volume. The program solved simultaneously the two regression equations of phases III and IV with the intersection representing the point of closing volume. Thirty volunteers were asked to perform three consecutive single breath nitrogen tests, all administered by an experienced laboratory technician. The tracings were also analyzed independently by two experienced observers. Correlation between vi and computer determination was excellent (r = 0. indicating that the computer method is as accurat its closing volume analysis as is the present day method of visual determination. The results of this study suggest that widespread use of such a progra could prove timesaving and eliminate the problem interobserver and intraobserver variation, which presently impair the reliability of the SB N. test.

3793. Computers in lung function tests (Germ) - KLEIN- UND GROSSRECHNER EINSATZ BI LUNGENFUNKTIONSUNTERSUCHUNGEN Rittel H.F., Waterloh E., Roessmann K. and Sch F.A. - Hochschularztl. Inst., Rhein. Westf. Techn. Hochsch., Aachen GFR - PRAX.PNEUMOL. 197 31/1 (1-24)

A computing system for monitoring and proce ergospirometric data is described. The examining room, equipped with electrocardiograph, apparatu for ergometric and blood pressure measurements a video terminal, is at some distance from where t computer PDP 8/e and printer, silent 700, are housed. The working of the on line system is described. Details are given of the use of a large small computer for calculating oxygen saturation the parameters of the acid base balance from measurements of pO., pCO., pH, and haemoglobi concentration. Computer produced results of bloo gas analyses and acid base balance and the diagno information they provide are discussed, with speci reference to their applications to sports medicine the preoperative assessment of respiratory functio The large CD 6400 computer at the computer cen of the Technical University, Aix la Chapelle, is available for processing the data of lung function tests with body plethysmography and blood gas analyses. Communication with the computer centr via teleprinter by means of Intercom. The large computer is capable of providing storage of data magnetic tape, sorting and analysing statistical material which require large storage space and producing diagrams. For storing the information obtained in 7,000 lung function tests which up to then had been recorded on 15,000 DIN A 3 recor cards, all the alphabetically and chronologically presorted data were transferred on to less than 10 microfilm cards. While storage on magnetic tape allows speedy data retrieval for the purpose of updating and statistical analysis recording on microfiche is a convenient means for the visual display of the entire archival material. The technic and uses of the microfiche system for archival purposes (COM system) are described.

9.10.3. Nervous system

3794. Application of electronic computer system to clinic and clinical research work on the hearing disturbed (Japanese) (Japa) - Tatsuki T., Ichinohe and Uchida J. - Dept. Otolaryngol. Iwate Med. U Morioka JAP - AUDIOL.JAP. 1976 19/5 (319-32

A method of input, output and analysis of hear by using the computer system is reported. Several ılts including the audiogram display in a form ilar to ordinary manual audiometry are illustrated.

5. The development of a full automatic nputerized audiometer (Japanese) (Japa) - Sakabe JAP - OTOLARYNGOLOGY (Tokyo) 1977 49/1 (75)

he authors developed a new type of audiometer in ch the measurement of the air borne conduction eshold obtained through the standard method and bone conduction threshold, except for the sking method, could be simultaneously attained. e characteristic features of this equipment are as ows: The instrument is provided with a rocomputer which is capable of performing the ing program of the subject's response to sound nuli and comparison of the measured data ultaneously. The instrument is also provided with audiogram display unit with standard audiogram nbols and character display panel with nprehensive instructions. The instrument can be d as a conventional audiometer. The digital minal data measurement can be readily adjusted at discretion of the user. More detailed information the audiogram may be obtained if aided by other computer employing on off processing tem

)6. Semiautomatic processing of neurophysiological ta: Part II. A computer program for data reduction - lcomyn F. and Burns M.D. - Dept. Entomol., iiv. Illinois, Urbana, Ill. 61801 USA - T.J.BIOMED.COMPUT. 1977 8/1 (61-71)

This paper describes a program for the processing trains of nerve or muscle impulses (spikes). The ogram is designed to allow the efficient use of miautomatic or manual measuring devices. It will ndle up to six different sets of spikes and one clic, non spike event (e.g., changing light intensity limb position, etc.). Output may include computed terspike intervals and instantaneous frequencies, ıase relationships between sets of spikes and tween spikes and the non spike event, and ırameters of bursts found in the spike trains. utput is presented numerically and in the form of ıe printer graphs.

'97. A computer program for the analysis of cerebello alamo cortical signals - Wing H.J. and Chan S.H.H. Dept. Physiol., Fac. Med., Univ. Hong Kong HOK COMPUTERS BIOMED.RES. 1976 9/6 (579-590)

A computer program has been developed to ıalyze the neuronal signals in the cerebello thalamo ortical pathway. The mathematical constants in an ıuation capable of approximating cortical responses ere systematically altered by the program in the lculation of theoretical cortical values. Using the orrelation coefficient between the computer enerated and the experimentally produced cortical sponses to the same thalamic signal, as evoked by a erebellar stimulation, the effects of varying these onstants can be determined. As these constants bear hysiological meanings, the connections between the erebellum, thalamus, and motor cortex, believed to play an important role in voluntary movements, can be studied in simulated, normal, and abnormal situations by introducing different values of these parameters into the program.

3798. New aspects of CSF dynamics revealed by sequential gamma camera scintigraphy and the digital analyser. I. Method and physiological patterns (Germ) - NEUE ASPEKTE DER LIQUORDYNAMIK BEIM MENSCHEN DURCH SEQUENTIELLE KAMERASZINTIGRAPHIE UND AUSWERTUNG MIT DIGITALANALYSATOR - Palma A. and Kolberg T. - Neurochir. Univ. Klin., Bonn GFR - ACTA NEUROCHIR. (Wien) 1977 36/1-2 (9-28)

The use of rapid sequential gamma camera scintigraphy in conjunction with computer aided storage and evaluation of data has shown to be a promising method for the analysis of CSF dynamics in man. Using this method the rapid flow of CSF in the basal cisterns can be studied. The further course of tracer activity in different CSF compartments can be followed, and slow currents may be demonstrated. Using this technique the patterns of varying regional CSF dynamics and reabsorption states can be examined. Intracranial activity after 24 hours is 40 to 45% and after 48 hours 20 to 30% of initial global activity. The similar behaviour of CSF circulation patterns in the basal cisterns, cisterna magna, and upper cervical area leads one to suggest that this complex of spaces forms a functional unity which may be called 'The distribution center of CSF'. Further movements of tracer substance seem to start from this complex. In the well recognised CSF pathways over the cerebral convexities some characteristic patterns of fluid flow are demonstrated. The flow times at different situations over the convexities are given. Analysis of spinal CSF flow shows that there are considerable variations in spinal CSF dynamics. Finally, the different uses of this method in various situations are indicated.

3799. Computer estimated alpha attenuation during problem solving in children with learning disabilities - Fuller P.W. - Child Developm. Ment. Retardat. Cent., Univ. Washington, Seattle, Wash. 98105 USA - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 1977 42/2 (149-156)

The parieto occipital EEG and power spectra were recorded during resting intervals, while listening to instructions on tape, and during active performance of mental arithmetic and immediate recall to determine if 10 boys with learning disabilities (LD) would show less alpha attenuation than 11 normal controls. The LD boys showed less alpha attenuation than the normal control boys. In addition, the control boys responded correctly to more of the problems. Since attention deficits are found in LD children, and attenuation of the parieto occipital alpha rhythm is correlated with attention, these results show that a deficit of the latter can be associated with disturbances in the former.

3800. On line computer rejection of EEG artifact -

Gevins A.S., Yeager C.L., Zeitlin G.M. et al. - EEG Syst. Group, Langley Porter Neuropsychiat. Inst., Univ. California, San Francisco, Calif. 94143 USA - ELECTROENCEPH.CLIN.NEUROPHYSIOL. 1977 42/2 (267-274)

Simple, on line, frequency domain procedures to detect non continuous artifact in the waking EEG are presented. Individual algorithms detect head and body movements, large muscle potentials and eye movement potentials. These algorithms are implemented as program modules in an interactive, real time spectral and transient analysis and display system, ADIEEG, described elsewhere. The system's performance in detecting artifact contaminated EEG in 35 normal and abnormal, 3 min, 8 channel recordings was compared with that of the consensus of 3 expert scorers. The system correctly detected 65% of the artifact events identified by the consensus of expert scores. Twenty seven percent of the detections made by the system were of events that had not been marked by any of the 3 scorers. This performance was not statistically different from the average of the individual scorers vs. the consensus. The largest number of false detections were of intermittent, high amplitude events of cortical origin which did not occur during the supervised calibration period.

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183 Brantigan J.W.
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372 Brown W.A.
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208 Carpenter D.A.
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2421 Carr P.H.
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1911 Carter D.R.
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3306 Caruso R.
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887 Daly B.J.
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